The New Observer's Book of

Warships

Hugh W Cowin

The New Observer's Series

WARSHIPS

About the Book

This new illustrated reference book provides a completely up-to-date overview of the many varieties of warships operated by navies throughout the world's waters. The warships are usefully grouped by function—thus permitting a ready comparison between vessels of a similar role and size—and range from the awesome nuclear-powered submarines and aircraft carriers to the modestly sized but indispensable landing craft. 179 photographs illustrate all the 165 classes and types described and vital data—including armament, sensor equipment and capability—is presented clearly and precisely. Altogether an invaluable guide to the recognition and evaluation of the world's warships.

About the Author

Hugh W. Cowin was born in 1934 and served in the Royal Air Force from 1951 to 1963. From the early 1960s onwards he has held posts in missiles and defence electronics and has involved himself in the broader aspects of defence market research. A prolific commentator on both aviation and defence-related matters, the author's interest and involvement in warships dates back for over a decade, and in *The New Observer's Book of Warships* he has employed his market research techniques to assemble a coherent overview of the world's warships. Married with a family, Hugh Cowin lives in Hatfield, Hertfordshire.

The New Observer's Book of

Warships

Hugh W. Cowin

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INTRODUCTION AND NOTES

This book sets out to provide a readily pocketable reference to a good cross section of the warships operated by navies worldwide. As a quick scan of the following pages shows, the diversity of naval vessels in current operation is quite startling, not only in terms of function, but also in age, as evidenced by the significant number of former US Navy World War II destroyers of the Gearing, Sumner and Fletcher classes still in service.

The contents have been arranged sectionally in such a way as to group together vessels of the same generic type, such as Cruisers, Destroyers, Frigates, Corvettes, etc. Within each section, vessels are normally grouped in desending order of displacement.

Identification

As aids to identification, warships not engaged in active service usually carry pennant numbers, consisting of either a single letter (descriptive of their primary function, such as D for destroyer), plus one, two, three or four number sequences that identify the individual ship. Alternatively, some navies, including the Soviet and US, simply display the numeric identifier only. To confuse matters, however, some navies, including the Soviet, follow the practice of frequently changing the pennant number of their ships. In such cases, all references to pennant numbers have been omitted in order to avoid subsequent confusion. In the case of those vessels carrying combined alphanumeric pennant numbers, the following table relates prefix letter to function:

A Auxiliary (support)
C Cruiser
D Destroyer
F Frigate or corvette
L Landing (assault)
M Mine countermeasures
N Minelayer
P Patrol or fast attack
R Aircraft carrier
S Submarine

Unfortunately, anomalies exist even in this area, exemplified by the Brazilian Navy's *Minas Gerais*, which despite its 'A' prefix

is an aircraft carrier and not an auxiliary. To compound the problem, the US Navy and those of the North Atlantic Treaty Organisation (NATO) employ a more detailed system of functional prefixes, which while not reflected in the ships' pennant numbers, is used almost universally in verbal and written references and, indeed, is made use of in this work as an aid to more clearly defining specific mission capability. In this prefix system, the letter prefixes (with the exception of cruisers and patrol and fast attack craft) are expanded into two letter groups, exemplified by SS for submarine; CV for aircraft carrier; BB for battleship; C for cruiser; DD for destroyer; FF for frigate, fleet (or ocean-going), as opposed to FL for frigate light, or corvette. To these basic groupings are added a further letter to provide additional mission-orientated qualifiers, such as N for nuclear-powered, G for guided missile-carrying, H for helicopter or VTOL aircraft-carrying, and B for ballistic missile-carrying. Thus the conventional aircraft-carrying, nuclear-powered USS *Nimitz* is a CVN, whilst the VTOL aircraft and helicopter-carrying Soviet aircraft carrier *Kiev*, equipped as it is with a formidable missile armament, is a CVHG.

Recognition

Unfortunately, all this preoccupation with defining a ship's primary and secondary mission capabilities has little bearing on the task of making visual recognition easier. Indeed, the pace of technology and altering mission needs have materially contributed to the problem, resulting in ship size and shape being relatively less important than in previous times. In this context such confusion is best illustrated by the Royal Navy's Type 22 Broadsword class frigates, which are, in fact, longer than the Type 42 Sheffield class destroyers. Further, the introduction of gas turbine propulsion has, to a great extent, freed the warship designer from having to place the propulsive machinery in its traditional amidships position, as exemplified by the US Navy's Sperry class frigates, which have an aft engine space location and so small a funnel (frequently referred to as stack) as to give the ships a side-on profile more akin to a fast attack craft than a frigate, particularly if the observer is deprived of some immediate aid to scaling. Unlike aircraft, which because of a combination of mission requirements and available engines have

tended to become more uniformly configured, warships have tended to become more dissimilar in external appearance, even within a given generic category. In short, the warship spotter's task has and will continue to grow more difficult, not easier, as a result of current developments.

Categorisation

While most sectional headings used in this book are self-explanatory, one or two areas of ambiguity do exist, as in the case of the Soviet Navy's Moskva class helicopter-carrying ships. As these ships have no full-length flight deck, they have been grouped as Cruisers. By the same definition, both the Royal Navy's Invincible class and the Soviet's Kiev class ships have been included in the Aircraft Carrier section.

In the Support Ships section, the convention of sequencing the entries by descending order of displacement has not been followed. In fact, this section has been deliberately split into two sub-groupings, the first relating to operational ships (replenishment vessels), and the second grouping formed from largely statically-based types, such as submarine tenders and salvage tugs.

While the only safe way to differentiate between modern warships is to group them by functional category as in this book, it is pertinent to note that middle and lower displacement classes of combatant vessels can be grouped within the following weight categories:

Destroyers: 8,000 to 2,000 tons full displacement
Frigates: 4,500 to 1,500 tons full displacement
Corvettes: 1,500 to 500 tons full displacement
Fast attack craft: 500 to 50 tons full displacement

Terminology

Within the section devoted to Submarines, the submariner's traditional practice of referring to his craft as a 'boat' has been followed.

Where only a sole example of a ship has been built, the word 'class' does not apply and the ship is more appropriately described in the entry heading as a 'type'.

Abbreviations

bhp	brake horsepower
CODAG, CODOG, COGAG, COSAG	These terms refer to propulsive machinery arrangements with CO referring to COmbining power transmission systems, D for Diesel, G for Gas turbine, S for Steam, with the fourth letter, either A or O, standing for And or Or
c-p	controllable-pitch (propellers)
ft	feet
IFF	Interrogation, Friend or Foe
kt	knots
m	metres
mm	millimetres
nav	navigation
shp	shaft horsepower
t	tonnes
VTOL	vertical take-off and landing (aircraft)
3-D	three-dimensional

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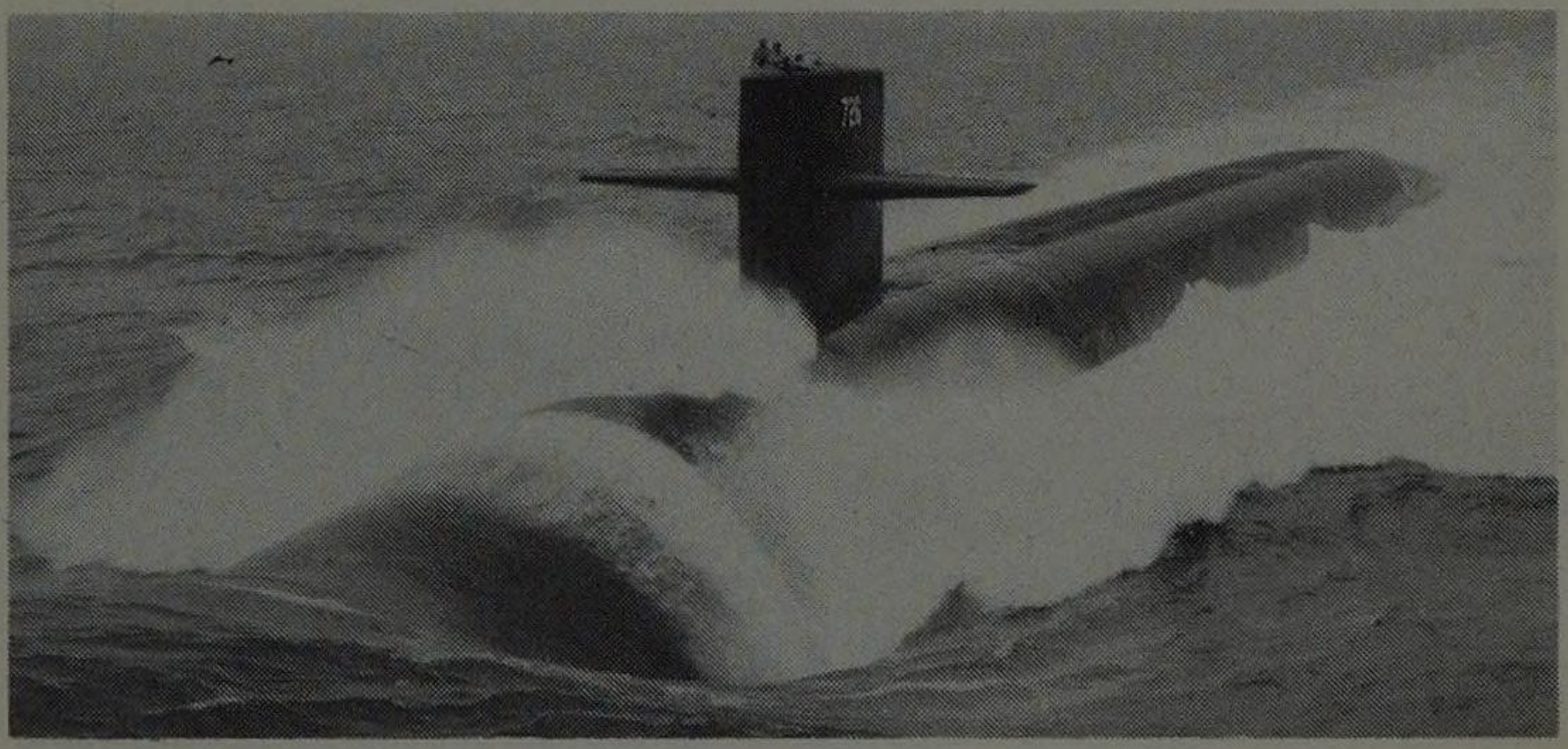
Ohio Submarines

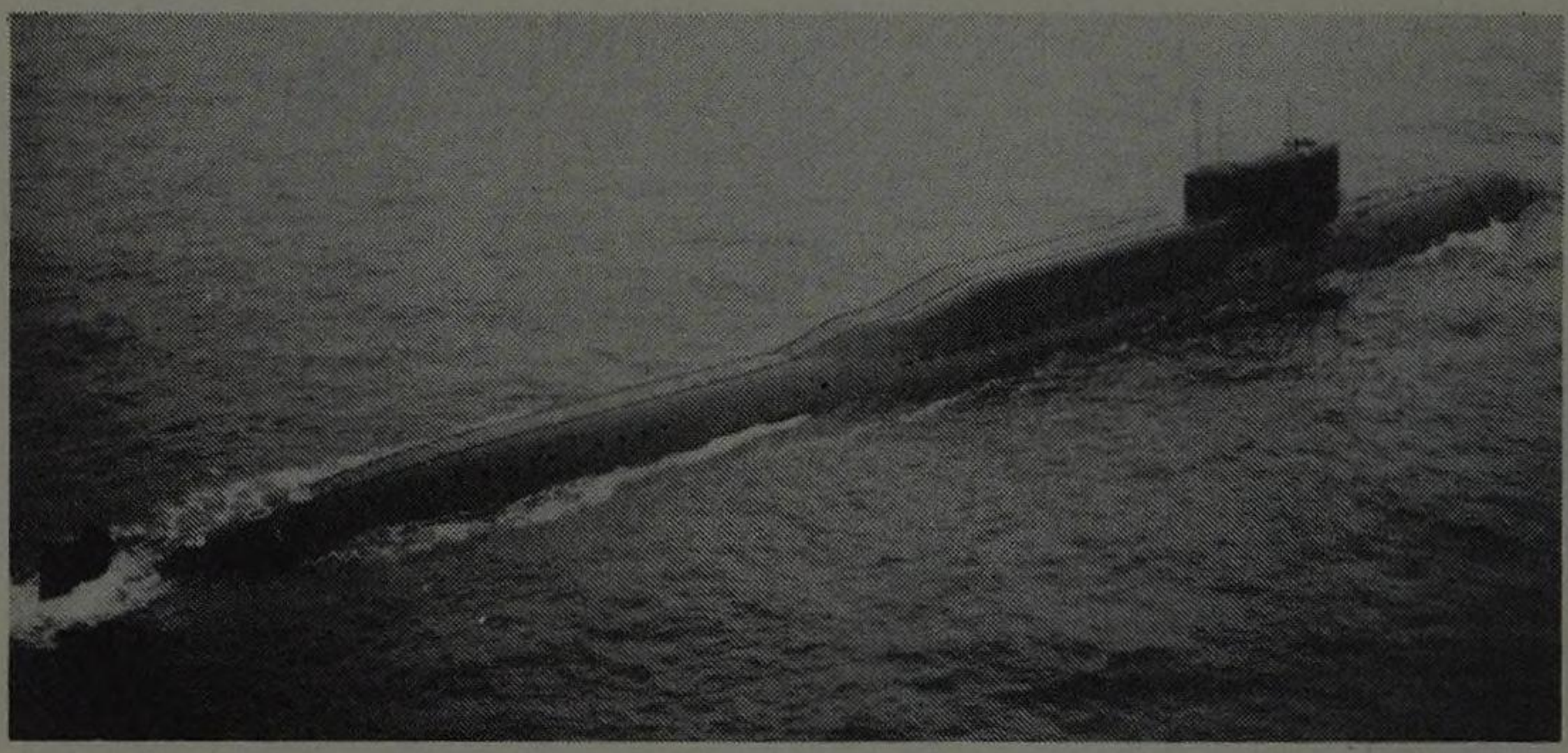


Only the crewmen atop USS *Ohio*'s sail help indicate size.

Role: Stategic power projection.
Builder: General Dynamics, USA.
User: US Navy.
Basic data: 18,700 t dived displacement; 560 ft (170.7 m) overall length; 42 ft (12.8 m) maximum beam. **Crew**: 157.
Propulsion: 1 General Electric S8G pressurised water nuclear reactor/1 General Electric geared steam turbine (60,000 shp); 1 propeller.
Sensors: BQQ-6 bow-mounted and towed array sonar system; 1 surface search radar; automated action information data processor.
Armament: 24 Trident submarine-launched intercontinental ballistic missiles; 4 heavyweight anti-submarine torpedo tubes.
Top speed: Over 20 kt dived. **Range**: Unlimited.
Programme: Approved in May 1972, the first delivery took place in October 1981. 8 vessels had been authorised by mid-1982, the ships and their planned delivery dates being: USS *Ohio* (SSBN726), October 1981; USS *Michigan* (SSBN727), September 1982; USS *Florida* (SSBN728), June 1983; USS *Georgia* (SSBN729), February 1984; USS *Rhode Island* (SSBN730), October 1984; USS *Alabama* (SSBN731), June 1985; along with the as yet unnamed SSBN732 and SSBN733, set for February 1986 and October 1986 delivery, respectively.
Notes: Nearly as long as a Virginia class cruiser, but significantly smaller than its Typhoon class Soviet contemporary.

Delta I class

Submarines

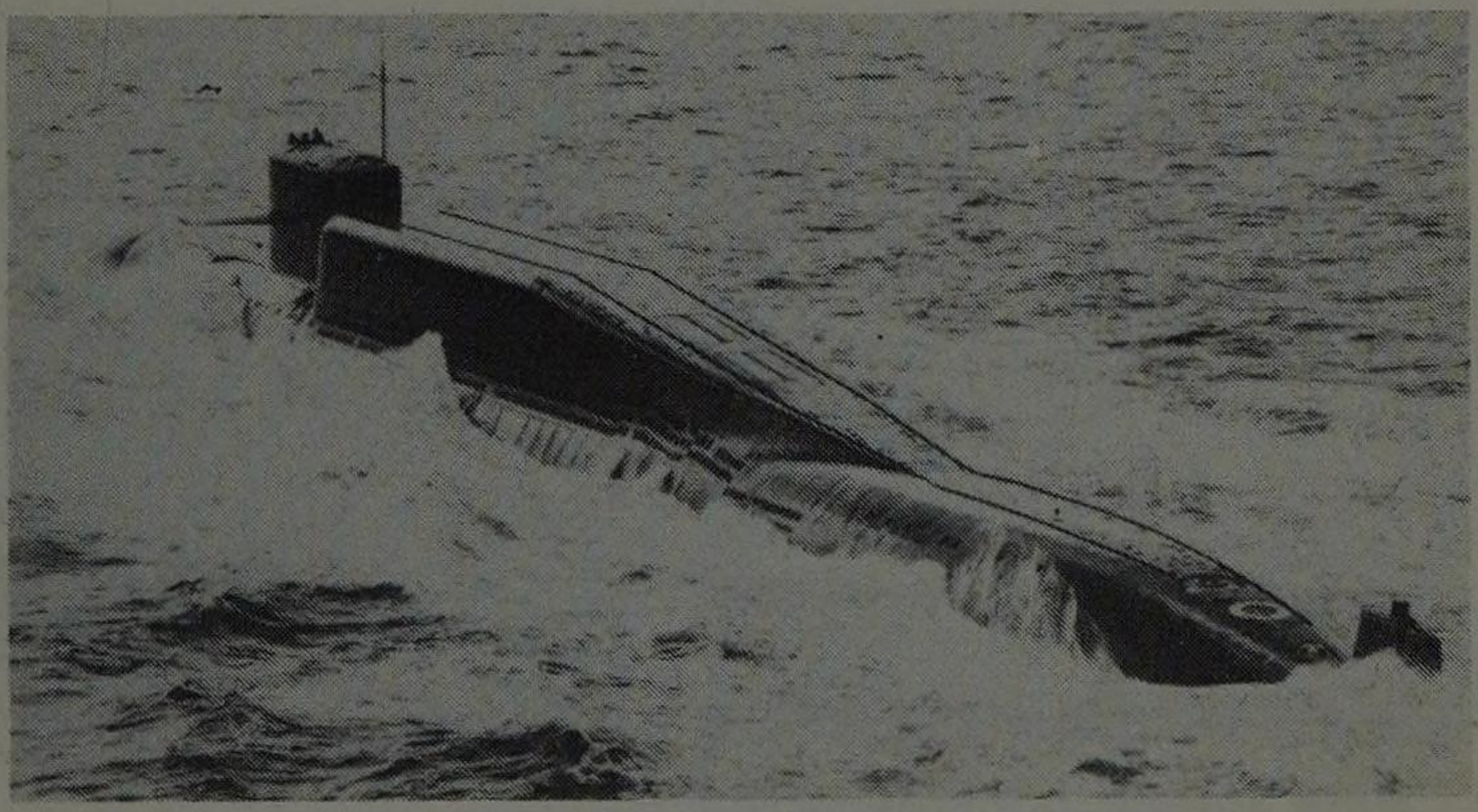


A Delta I class with its 'stepped' aft saddle deck.

Role: Strategic power projection.
Builders: Severodvinsk & Komsomolsk, USSR.
User: Soviet Navy.
Basic data: 9,700 t dived displacement; 460 ft (140 m) overall length; 39.4 ft (12 m) maximum beam. **Crew**: 100.
Propulsion: 1 nuclear reactor/steam turbines; 2 propellers.
Sensors: 1 surface search radar; undesignated sonars.
Armament: 12 SS-N-8 intercontinental, submarine-launched ballistic missiles; 6 heavyweight anti-submarine torpedo tubes with 18 torpedoes.
Top speed: 25 kt dived. **Range**: Unlimited.
Programme: A 16 ship class, the Delta Is all entered service between 1971 and 1977.
Notes: In 1968, the Soviet Navy deployed the first of 34 Yankee class ballistic missile-carrying submarines. The 9,500 ton dived Yankees represented the first credible Soviet attempt to produce a strategic submarine comparable to the US George Washington class of nearly a decade earlier. However, despite the large numbers of Yankees built, these submarines suffered from the very real operational limitations imposed by the modest 1,600 nautical mile range of their SS-N-6 missiles, 16 of which are carried by the Yankee class. Logical developments of the Yankee design, the Delta Is are larger and heavier, being built to carry 12 of the 4,000 nautical mile ranged SS-N-8 missiles, which, in range terms at least, eclipsed the US's Poseidon by around 800 nautical miles.

Delta II and III classes

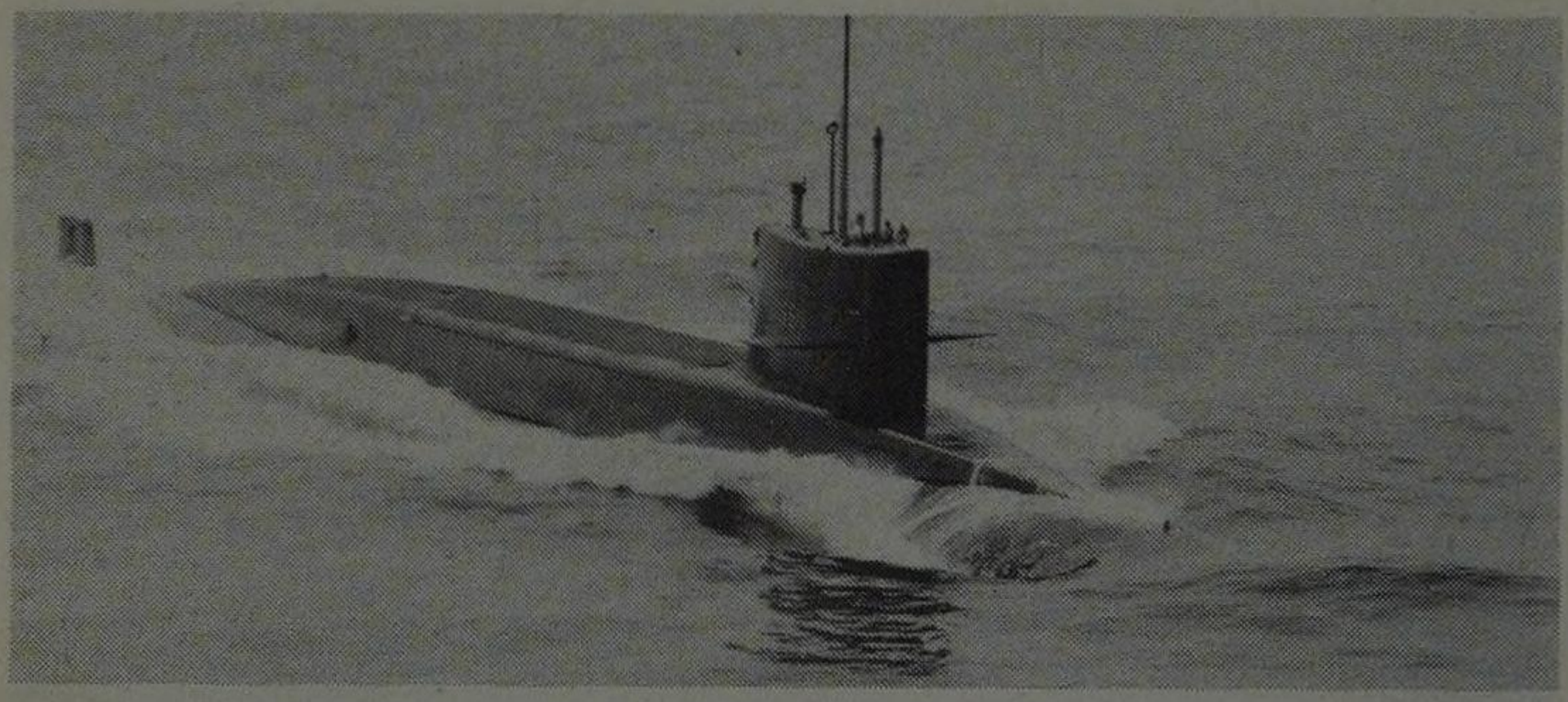
Submarines



A Soviet Navy Delta II running on the surface.

Role: Strategic power projection.
Builder: Severodvinsk, USSR.
User: Soviet Navy.
Basic data: 11,300 t (Delta II), 13,250 t (Delta III) dived displacement; 508 ft (155 m) overall length; 39.4 ft (12 m) maximum beam. **Crew**: 100 (Delta II), 120 (Delta III).
Propulsion: 1 nuclear reactor/steam turbines; 2 propellers.
Sensors: 1 surface search radar; undesignated sonars.
Armament: 16 SS-N-8 (Delta II) or 16 SS-N-18 (Delta III) intercontinental, submarine-launched ballistic missiles; 6 heavyweight anti-submarine torpedo tubes with 18 torpedoes (Delta II) or 12 torpedoes (Delta III).
Top speed: 24 kt dived. **Range**: Unlimited.
Programme: The Delta IIs were an interim 2 ship class built in the 1974/5 period immediately followed by the Delta IIIs, the first of which entered service in 1975. At least 10 Delta IIIs are known to have been built by the close of 1980, at which time the construction of additional Delta IIIs was being reported by US intelligence sources.
Notes: Just under 50 feet longer than the Delta I the saddle tapers down in an unbroken fashion to meet the main pressure hull. The only external difference between the Delta II and III lies in the increased height of the III's saddle structure, which almost merges with the top of the submarine's sail (conning tower).

Le Redoutable class

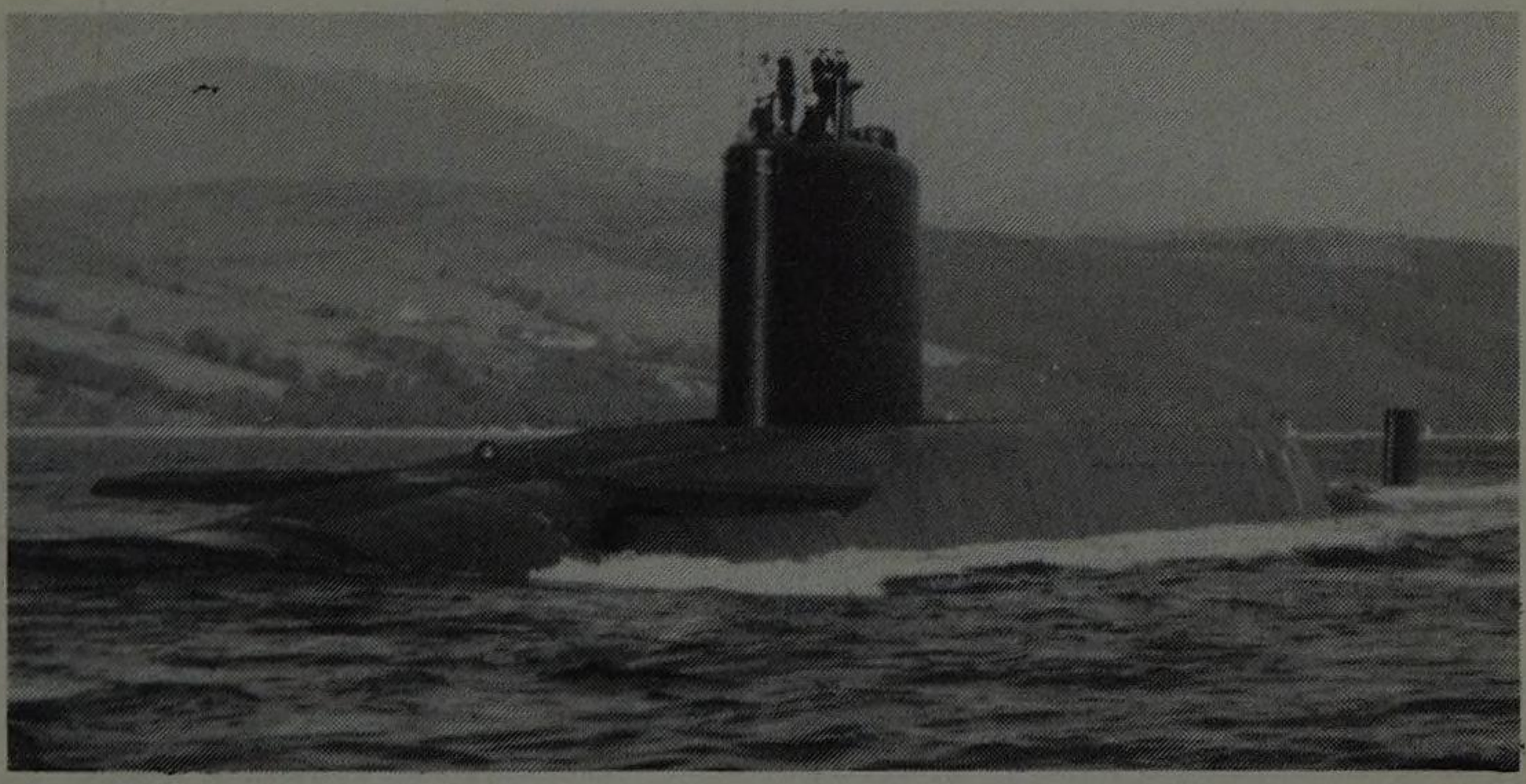


The ballistic missile equipped *Le Redoutable* (S611).

Role: Strategic power projection.
Builder: Cherbourg, France.
User French Navy.
Basic data: 9,000 t dived displacement; 419.95 ft (128 m) overall length; 34.8 ft (10.6 m) maximum beam. **Crew**: 135.
Propulsion: 1 nuclear reactor/2 Geared steam turbines; 1 propeller.
Sensors: Undisclosed active and passive sonar systems.
Armament: 16 M20 thermo-nuclear ballistic missiles; 4 light-weight anti-submarine torpedo tubes (18 torpedoes).
Top speed: 20 kt dived. **Range**: Unlimited.
Programme: Ordered on an incremental basis, the first 2 of this 5 boat class were authorised in 1963. The class comprises: *Le Redoutable* (S611), *Le Terrible* (S612), *Le Foudroyant* (S610), *L'Indomptable* (S613) and *Le Tonnant* (S614). All were laid down between 1964 and 1973 and respectively entered service in December 1971, January 1973, June 1974, December 1976 and May 1980.
Notes: Unlike the Royal Navy's Resolution class ballistic missile carrying submarines, which lean heavily on both US nuclear reactor and hull design, the Le Redoutable class boats are the result of the French Government's 1960 decision to develop their own nuclear-powered submarine and parallel ballistic missile programmes. Interestingly, this class of boat employs a hybrid propulsion system, using the nuclear reactor as its main power source, but backed by a diesel-electric auxiliary system, capable of a range of 5,000 nautical miles.

Resolution class

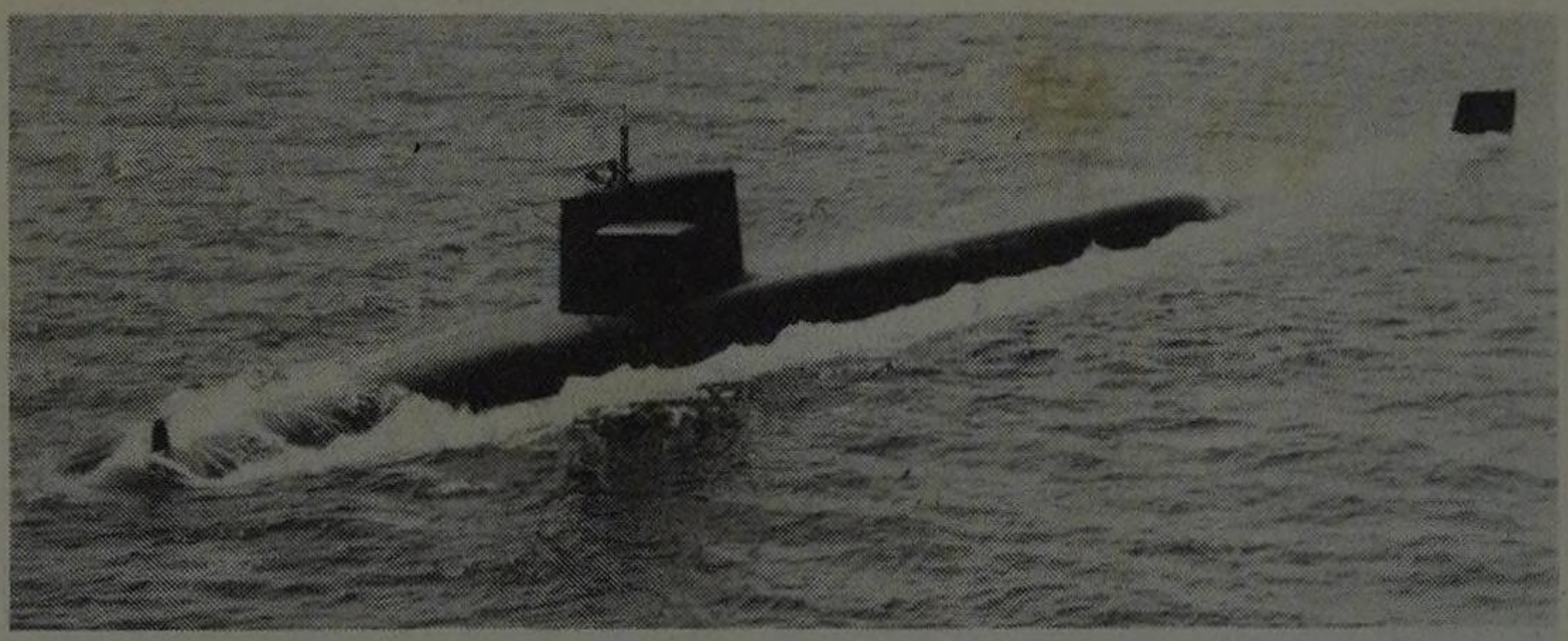
Submarines



HMS *Resolution* (S22).

Role: Strategic power projection. **Builders**: Various, UK.
User: Royal Navy.
Basic data: 8,400 t dived displacement; 425 ft (129.5 m) overall length; 33 ft (10.1 m) maximum beam. **Crew**: 143.
Propulsion: 1 Rolls-Royce pressurised water nuclear reactor/ 1 English Electric geared steam turbine (c. 20,000 shp); 1 propeller.
Sensors: 1 Type 1003 surface search radar; 1 type 2001 and 1 Type 2007 bow-mounted sonars.
Armament: 16 Polaris A3 thermo-nuclear ballistic missiles; 6 tubes for heavyweight anti-submarine torpedoes.
Top speed: 25 kt dived. **Range**: Unlimited.
Programme: The first of this 4 boat class was laid down at Vickers' Barrow-in-Furness yards in February 1964 and the last completed in late 1969. The class comprises: HMS *Resolution* (S22), HMS *Repulse* (S23), HMS *Renown* (S26) and HMS *Revenge* (S27), the first pair being built by Vickers and the second two being constructed by Cammell Laird of Birkenhead. The respective commissioning dates for the boats were October 1967, September 1968, November 1968 and December 1969.
Notes: Although differing considerably in detail, the overall design of the Resolution class is based on that of the US Navy's Lafayette class submarine, both in terms of their nuclear reactor and hull technology; the major external difference being that the Resolution class are fitted with bow section hydroplanes.

Lafayette/Franklin class Submarines



USS *Casimir Pulaski* (SSBN633) in the Atlantic, April 1979

Role: Stategic power projection. **Builders**: Various, USA.
User: US Navy.
Basic data: 8,250 t dived displacement; 425 ft (129.5 m) overall length; 33 ft (10.1 m) maximum beam. **Crew**: 141.
Propulsion: 1 Westinghouse S5W pressurised water nuclear reactor/2 geared steam turbines (total 15,000 shp); 1 propeller.
Sensors: 1 BQR-7, plus BQR-19 and 1BQS-4 bow-mounted sonars; 1 BQR-15 towed array sonar.
Armament: 16 Poseidon or Trident submarine-launched intercontinental ballistic missiles; 4 heavyweight anti-submarine torpedo tubes.
Top speed: c.25 kt dived. **Range**: Unlimited.
Programme: USS *Lafayette* (SSBN616), the lead boat, was laid down in January 1961 at the Groton, Connecticut, yards of General Dynamics' Electric Boat Division, launched in May 1962 and commissioned in April 1963. *Lafayette* was followed by another 30 boats to make a 31 ship class, the last of which, USS *Will Rogers* (SSBN659), was commissioned in April 1967. Besides General Dynamics, other shipbuilders participating in the programmes were 2 US Navy dockyards and Newport News. The final 12 boats, starting with the USS *Benjamin Franklin* (SSBN640), incorporated numerous detail design changes and are thus sometimes referred to as a separate class. The **Franklin class** were the first to be retrofitted to operate with the Trident missile, the initial deployment being carried out by USS *Francis Scott Key* (SSBN657) in October 1979.
Notes: The Lafayettes are a direct development of the Ethan Allens.

Los Angeles class Submarines

USS *Birmingham* (SSN695) in a trial high speed ascent.

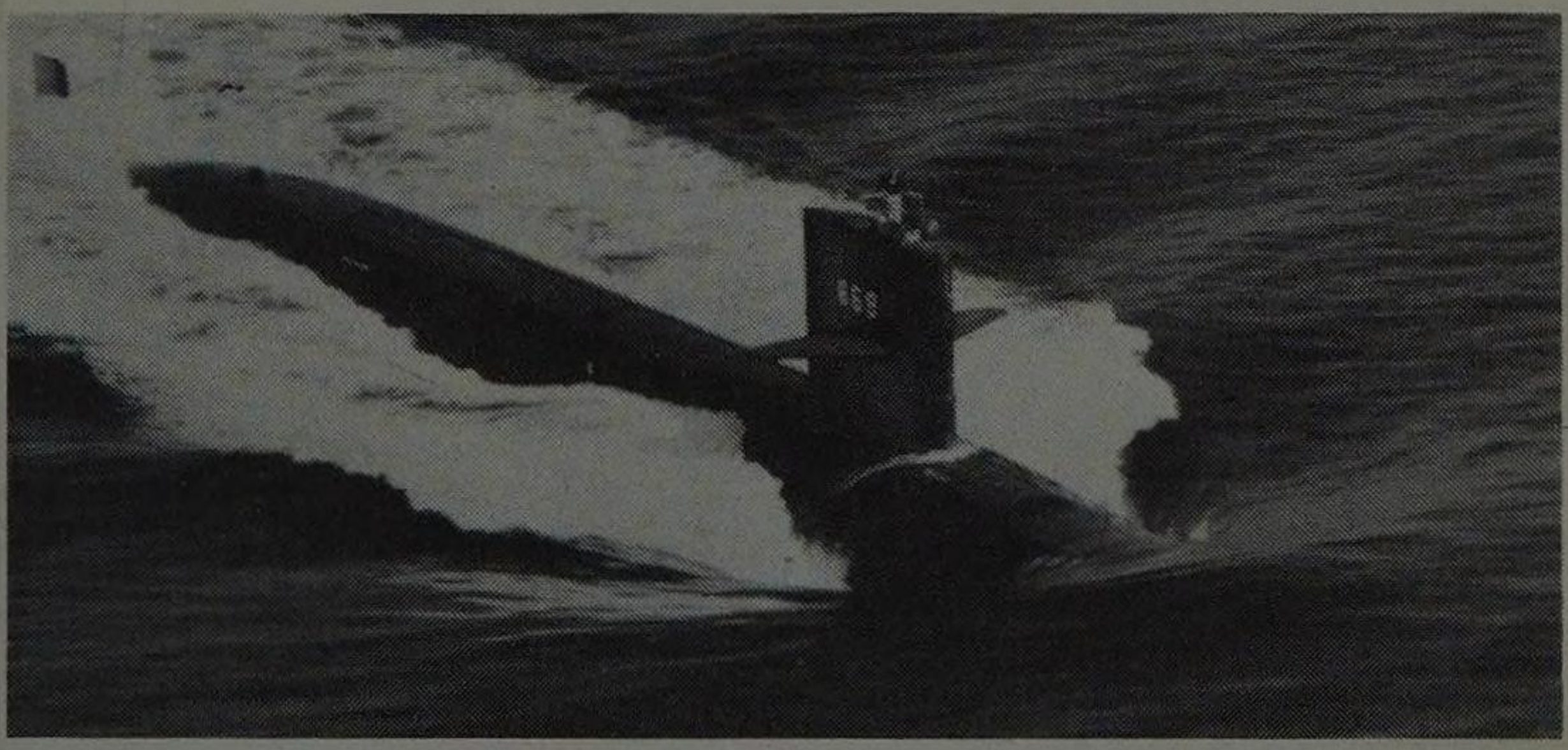
Role: Anti-submarine.
Builders: Newport News & General Dynamics, USA.
User: US Navy.
Basic data: 6,900 t dived displacement; 360 ft (109.7 m) overall length; 33 ft (10.1 m) maximum beam. **Crew**: 127.
Propulsion: 1 General Electric S6G pressurised water nuclear reactor/2 geared steam turbines (total 30,000 shp); 1 propeller.
Sensors: 1 BPS-15 surface search radar; 1 BQQ-5 bow-mounted sonar: 1 BQS-13 sonar; 1 BQS-15 sonar; 1 passive towed array sonar.
Armament: 4 amidships torpedo tubes for Harpoon anti-ship missiles or heavyweight anti-submarine torpedoes or Tomahawk cruise missiles in boats up to SSN719, with SSN719 and onwards carrying additional Tomahawks in vertical launch tubes.
Top speed: Over 30 kt dived. **Range**: Unlimited.
Programme: Currently a 37 boat class, the first keel, that of USS *Los Angeles* (SSN688), was laid down in January 1972 and this ship commissioned in November 1976. Some 23 boats should have been delivered by the end of 1982, comprising 8 built by Newport News (SSNs 688, 689, 691, 693, 695 and 711 to 713) and with General Dynamics having completed 15 (SSNs 690, 692, 694 and 696 to 707). Based on current delivery scheduling, the first of the vertically-launched Tomahawk carriers, SSN719, should be completed by General Dynamics in 1984.
Notes: Designed to counter the Soviet Navy's Charlie and Victor classes, the mission capability of these hunter/killer submarines, already expanded by Harpoon, will be further enhanced by Tomahawk.

Victor I, II and III classes Submarines

A Victor I class hunter/killer submarine.

Role: Anti-submarine. **Builder**: Leningrad, USSR.
User: Soviet Navy. **Crew**: 80 (Victor II).
Basic data: 5,100 t (Victor I), 5,700 t (Victor II) dived displacement; 311 ft (95 m) (Victor I), 328.1 ft (100 m) (Victor II) overall length; 32.8 ft (10 m) maximum beam. No data available on Victor III class vessels.
Propulsion: 1 nuclear reactor/steam turbines; 1 propeller.
Sensors: Advanced passive sonar and other electronics systems.
Armament: 8 heavyweight anti-submarine torpedo tubes; unknown number of SS-N-15 anti-submarine, submarine-launched missiles.
Top speed: More than 30 kt dived. **Range**: Unlimited.
Programme: The first of the 14 ship Victor I class was completed in 1967 and the last was delivered in 1974. These ships were to be followed by at least 8 Victor IIs and the programme is continuing with construction of the even larger Victor IIIs.
Notes: Designed to replace the earlier November class nuclear-powered attack submarines, the Victors, despite their bulbously gross appearance, are amongst the fastest warships extant, having a sustained submerged speed greater than that of the very briefly sustainable 'dash' speed of most surface combatants.

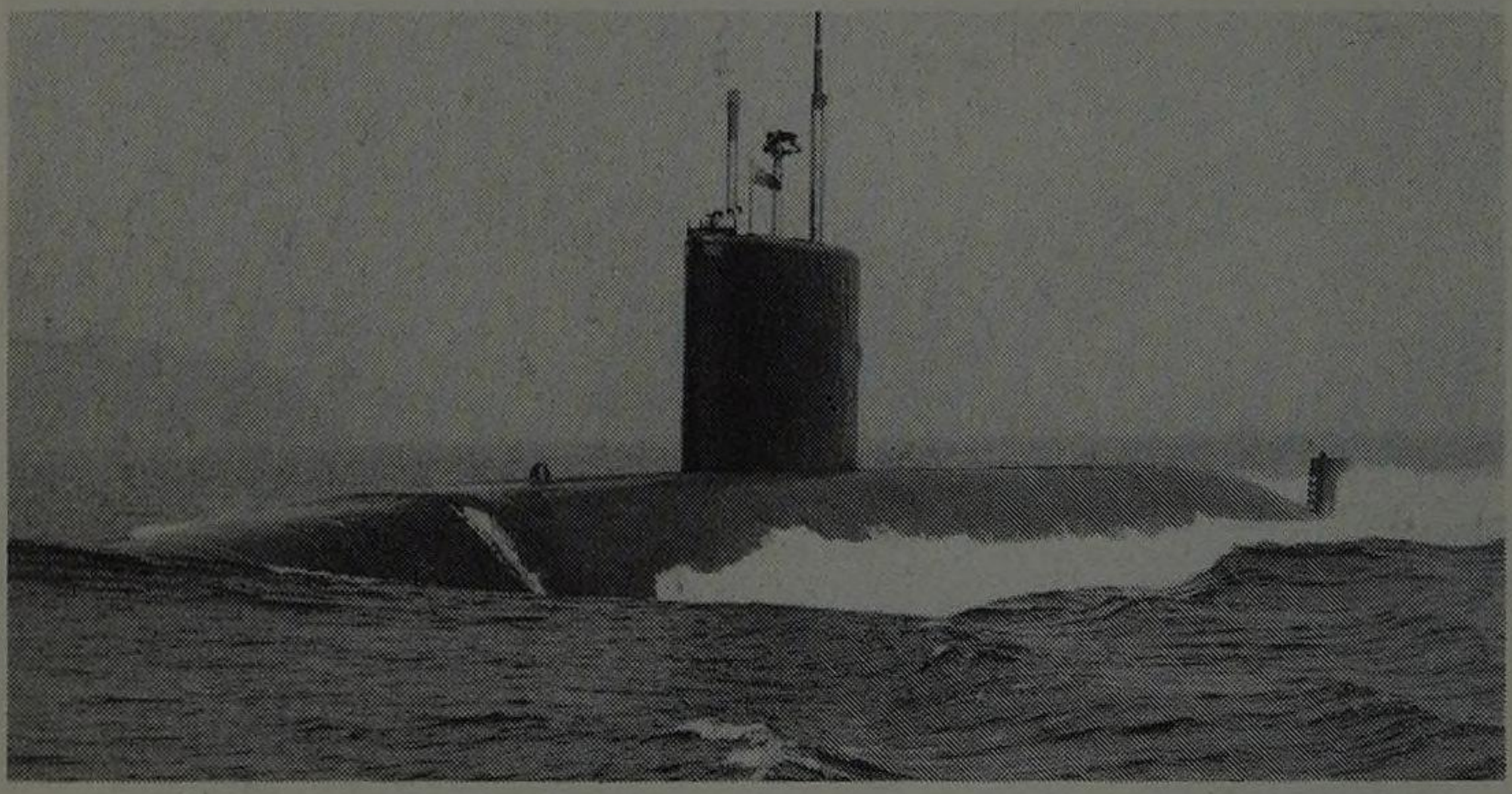
Sturgeon class



USS *Seahorse* (SSN669) Sturgeon class hunter/killer.

Role: Anti-submarine.
Builders: Various, USA.
User: US Navy.
Basic data: 4,650 t dived displacement; 292.2 ft (89 m) overall length; 31.7 ft (9.7 m) maximum beam. **Crew**: 130.
Propulsion: 1 Westinghouse S5W pressurised water nuclear reactor/1 General Electric or De Laval geared steam turbine (15,000 shp); 1 propeller.
Sensors: 1 BPS-15 surface search radar; 1 of various bow-mounted sonars, coupled with towed array sonar system.
Armament: Tomahawk cruise missiles; Harpoon anti-ship missiles; 4 heavyweight anti-submarine torpedo tubes.
Top speed: 30 kt dived. **Range**: Unlimited.
Programme: This 37 boat class, commissioned between March 1967 through August 1975 and involving construction in 6 separate shipyards, comprises: USS *Sturgeon* (SSN637), *Whale* (638), *Tautog* (639), *Grayling* (646), *Pogy* (647), *Aspro* (648), *Sunfish* (649), *Pargo* (650), *Queenfish* (651), *Puffer* (652), *Ray* (653), *Sand Lance* (660), *Lapon* (661), *Gurnard* (662), *Hammerhead* (663), *Sea Devil* (664), *Guitarro* (665), *Hawkbill* (666), *Bergall* (667), *Spadefish* (668), *Seahorse* (669), *Finback* (670), *Pintado* (672), *Flying Fish* (673), *Trepang* (674), *Bluefish* (675), *Billfish* (676), *Drum* (677), *Archerfish* (678), *Silverside* (679), *William H. Bates* (680), *Batfish* (681), *Tunny* (682), *Parche* (683), *Cavalla* (684), *L. Mendel Rivers* (686) and *Richard R. Russel* (687).
Notes: A development of the earlier 13 boat Permit class design.

Swiftsure class



HMS *Swiftsure* (S126) hunter/killer submarine.

Role: Anti-submarine. **Builder**: Vickers, UK.
User: Royal Navy.
Basic data: 4,500 t dived displacement; 272 ft (82.9 m) overall length; 33.2 ft (10.12 m) maximum beam. **Crew**: 97.
Propulsion: 1 nuclear pressurised water reactor/1 steam turbine (20,000 shp); 1 propeller.
Sensors: 1 surface search and nav radar; 4 sonars (including 3 active-passive systems).
Armament: 5 heavyweight anti-submarine torpedo tubes with 20 torpedoes or submarine-launched Harpoon long-range anti-ship missiles.
Top speed: 30 kt dived. **Range**: Unlimited.
Programme: The construction of this 6 boat class was initiated in June 1969 and completed in early 1981. The vessels and their commissioning dates are: HMS *Swiftsure* (S126), April 1973; HMS *Sovereign* (S108), July 1974; HMS *Superb* (S109), November 1976; HMS *Sceptre* (S104), February 1978; HMS *Spartan* (S111), September 1979 and HMS *Splendid* (S112), May 1981.
Notes: As with the Soviet Navy's Victor class submarines, the Swiftsures were designed to provide a forward anti-submarine screen to an advancing naval task force. However, the Swiftsures' mission capability is currently being expanded to include a useful secondary anti-shipping function as the vessels are progressively equipped with Sub-Harpoon missiles.

Charlie I and II classes

Submarines

A Charlie I anti-ship cruise missile carrier.

Role: Anti-shipping. **Builder**: Gorki, USSR.
User: Soviet Navy. **Crew**: 80.
Basic data: 4,200 t (Charlie I), 5,100 t (Charlie II) dived displacement; 311 ft (95 m) (Charlie I), 338 ft (103 m) (Charlie II) overall length; 32.8 ft (10 m) maximum beam.
Propulsion: 1 nuclear reactor/steam turbines; 1 propeller.
Sensors: Advanced passive sonar and electronic systems.
Armament: 6 heavyweight anti-submarine torpedo tubes; 8 SS-N-7 (Charlie I) or 8 SS-N-15 or SS-N-9 submarine-launched, anti-ship cruise missiles. Some if not all Charlie class are equipped to carry 8 SS-N-9 'Siren' submarine-launched, anti-ship missiles.
Top speed: 27 kt dived. **Range**: Unlimited.
Programme: Initially deployed in 1968, about 12 Charlie Is were built before the type was superseded in 1973 by the larger and heavier Charlie II, of which 4 had been delivered by 1979 and construction of the class was reported to be continuing during 1981.
Notes: Built as successors to the 50 or so earlier diesel-powered Juliett class and nuclear-powered Echo class cruise missile-carrying submarines, the primary task of the Charlie classes in to engage an oncoming enemy task force from a range of around 30 nautical miles when using SS-N-7s, or 60 nautical miles if equipped with SS-N-9s. All missiles can be fired from underwater.

Alfa class

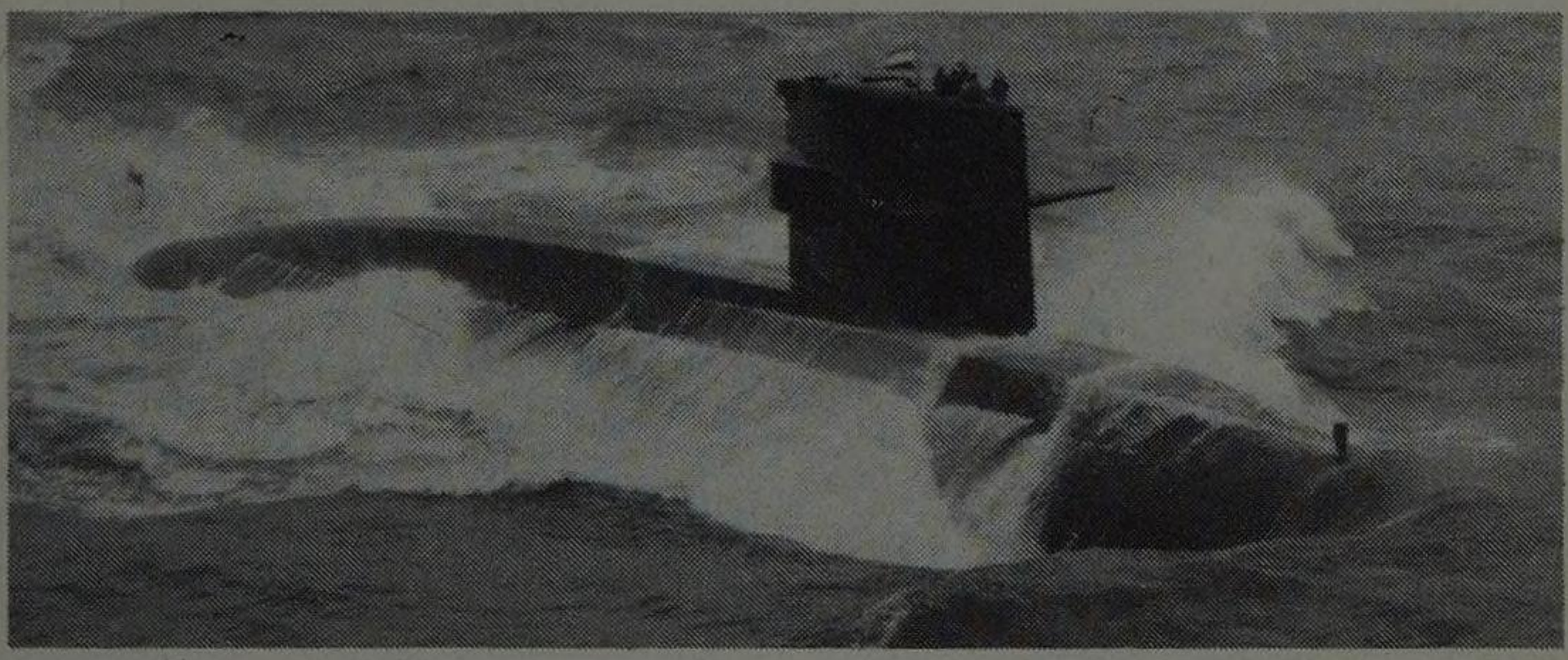
Submarines

An Alfa class running on the surface, July 1981.

Role: Anti-submarine. **Builder**: Leningrad, USSR.
User: Soviet Navy.
Basic data: 2,760 t dived displacement; 262 ft (80 m) overall length; 32.8 ft (10 m) maximum beam. **Crew**: 60.
Propulsion: 1 nuclear reactor/steam turbines; 1 propeller.
Sensors: 1 surface search radar; comprehensive suite of advanced sonars and other electronic detection systems.
Armament: 6 heavyweight anti-submarine torpedo tubes with 20 torpedoes, or SS-NX-16 submarine-launched, rocket-propelled anti-submarine missiles.
Top speed: 49 kt dived. **Range**: Unlimited.
Programme: Believed to have been initiated during 1972, 3 or more were known to have been built by the end of 1980, at which time US intelligence reports indicated that the class had entered series production.
Notes: Believed to be the fastest and deepest diving operational submarine yet built, the small, extremely clean, titanium-hulled Alfa class hunter/killers have a submerged top speed significantly faster than that of a number of torpedoes currently in service with navies in the West. This intrinsic advantage of being able to outrun most torpedoes is further complemented by the boat's ability to dive to depths of around 4.425 feet for short periods, or loiter at nearly 3,000 feet. While titanium is a very expensive material, it is extremely strong and is also non-magnetic.

Zwaardvis class

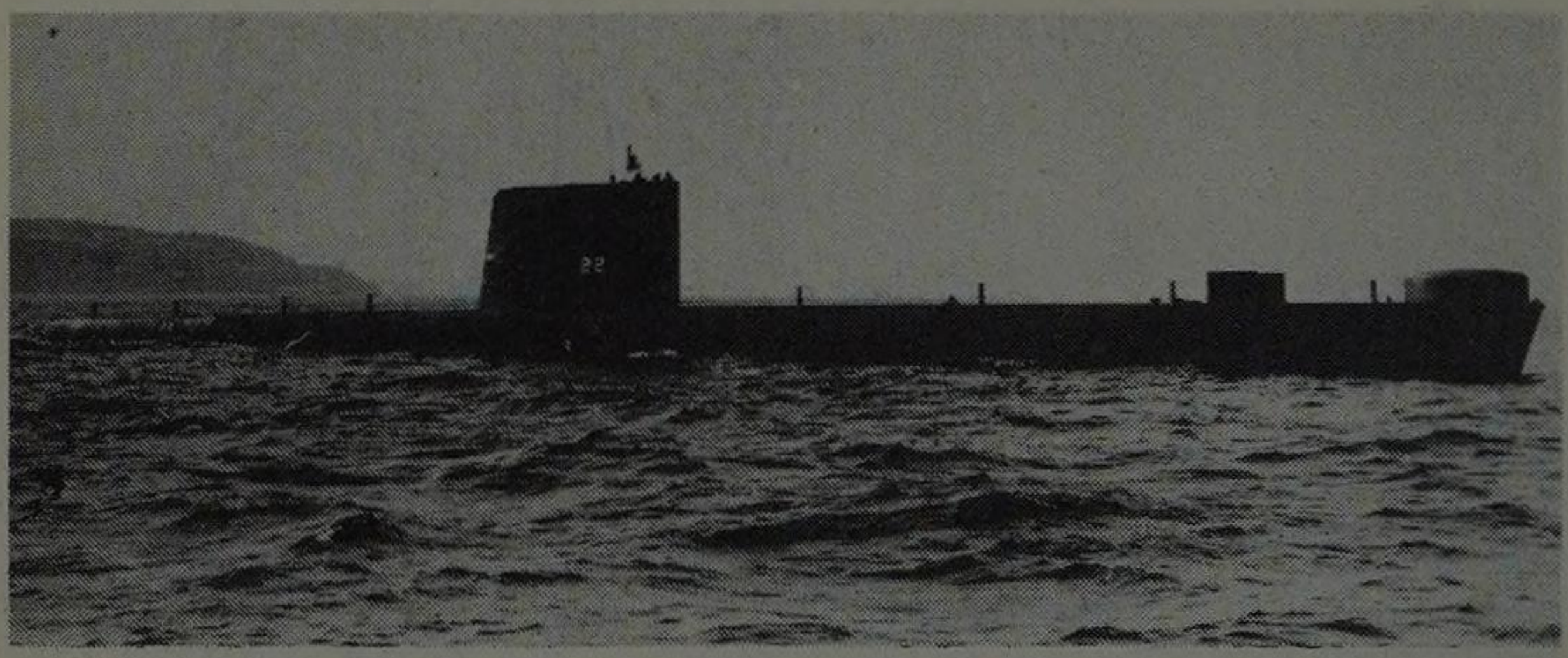
Submarines



HNLMS *Tijgerhaai* (S807) patrol submarine.

Role: Patrol.
Builder: RDM, Netherlands.
User: Royal Netherlands Navy.
Basic data: 2,640 t dived displacement; 219.6 ft (66.92 m) overall length; 27.6 ft (8.4 m) maximum beam. **Crew**: 67.
Propulsion: 3 diesel generators (total 4,200 bhp)/batteries/1 electric motor; 1 propeller.
Sensors: 1 surface search radar; comprehensive sonar equipment.
Armament: 6 heavyweight anti-submarine torpedo tubes (20 torpedoes).
Top speed: 20 kt dived.
Range: Not known, but boats have snorkel.
Programme: This 2 boat class, consisting of HNLMS *Zwaardvis* (S806) and HNLMS *Tijgerhaai* (S807), were both laid down in July 1967 and entered service with the Royal Netherlands Navy in August 1972 and October 1972, respectively.
Notes: The design of the Zwaardvis boats is based on that of the US Navy's Barbel class diesel-electric submarine, but incorporates Dutch equipment, which, in turn, necessitates both internal and external modification. Most noticeable differences between the US and Dutch submarines is visible in the faired appendage halfway up the trailing edge of the Dutch boat's 'sail' or conning tower. Another external difference lies in the raised aft upper coaming of the Zwaardvis boats' hulls, which starts approximately halfway back along the 'sail'. To help quieten the boats during 'silent running' operations, all noise-producing machinery is mounted on anti-vibration attachments for maximum shock/noise absorbtion.

Porpoise/Oberon classes Submarines

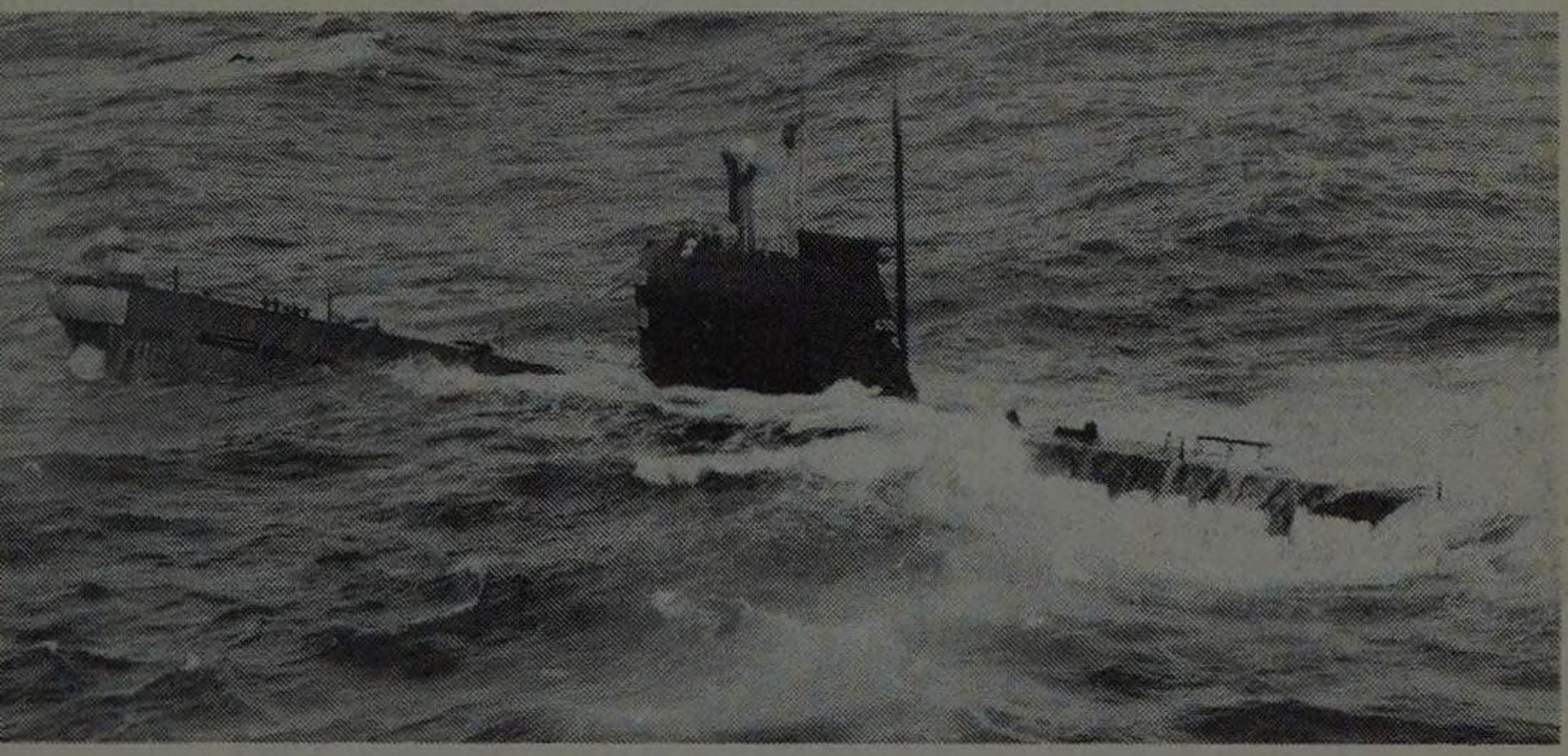


O'Brien (S22), one of two Chilean Navy Oberon class.

Role: Patrol. **Builders**: Various, UK.
User: Navies of Australia, Brazil, Canada, Chile and UK.
Basic data: 2,410 t dived displacement; 295 ft (89.9 m) overall length; 26 ft (7.9 m) maximum beam. **Crew**: c.70.
Propulsion: 2 Admiralty SR 16-cylinder diesels/batteries/2 electric motors (total 6,000 shp); 2 propellers.
Sensors: 1 Type 1002 or 1 Type 1006 surface search and nav radar; 1 Type 186 and 1 Type 187 bow-mounted sonars.
Armament: 6 bow tubes for 20 heavyweight anti-submarine torpedoes; 2 stern tubes for 4 heavyweight anti-submarine torpedoes.
Top speed: c.16 kt dived.
Range: Submerged endurance quoted as being in excess of 6 weeks with periodic use of snorkel.
Programme: 3 Porpoise class and 27 out of the original 33 Oberons remain in service. Both classes, which are virtually identical, were built between 1954 and 1967 and are currently distributed thus: Australia 6, Brazil 3, Canada 3 (modified and known as **Ojibwa class**), Chile 2 and UK 13 Oberon and 3 Porpose class.
Notes: Generally considered excellent submarines, the Obers are especially liked by their crews for their relatively superior habitability and living quarters. Maximum diving depth has been quoted as around 655 feet (200 m); a depth well surpassed by more modern diesel-electric powered submarines. Although the Vickers Type 2400 design replacement for these classes has existed for some years, approval to proceed with this programme was only recently received.

Foxtrot class

Submarines

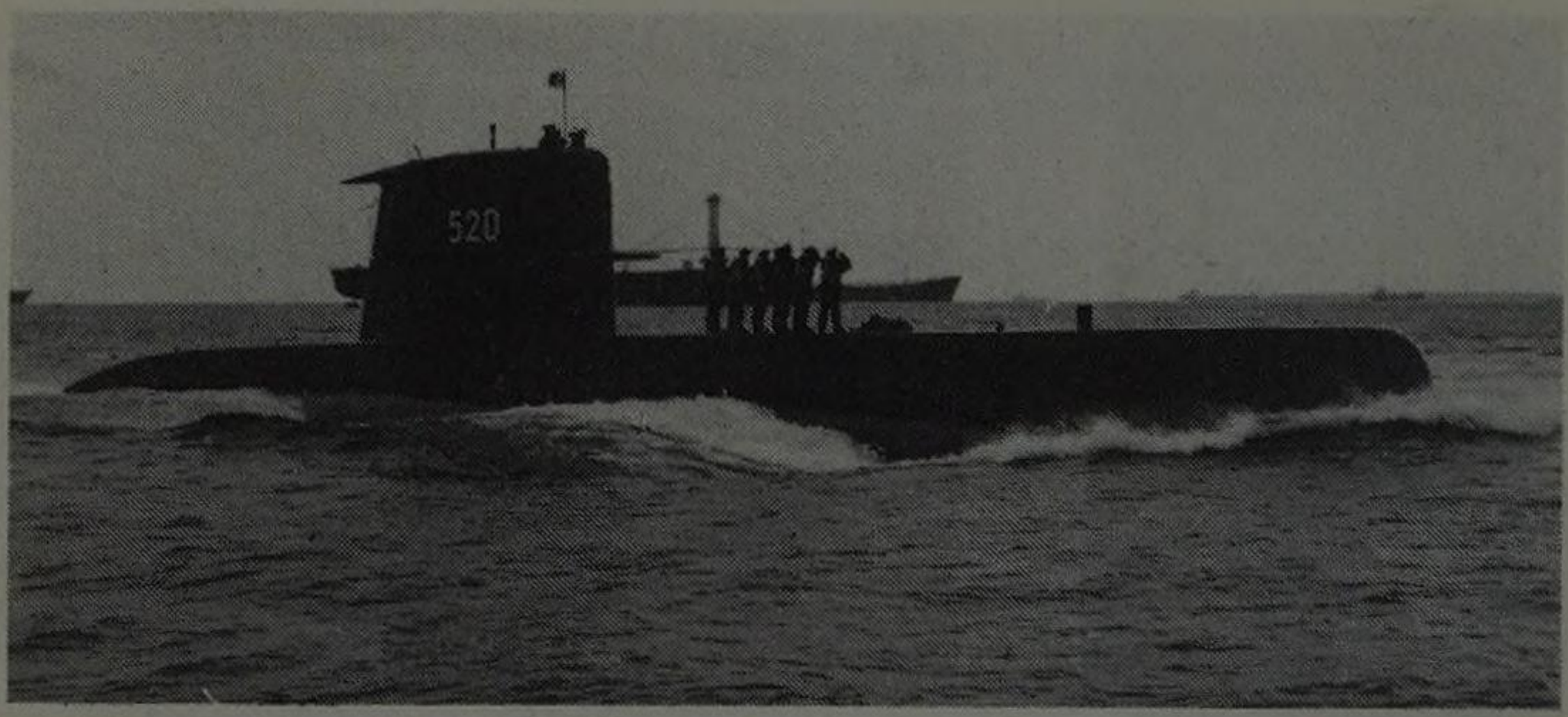


A Soviet Foxtrot class photographed off Sicily, 1975.

Role: Patrol.
Builder: Leningrad, USSR.
Users: Navies of USSR, India, Libya and Cuba.
Basic data: 2,400 t dived displacement; 315 ft (96 m) overall length; 24.6 ft (7.5) maximum beam.
Crew: 78.
Propulsion: Diesels (total 6,000 bhp)/batteries/electric motors; 3 propellers.
Sensors: 1 surface search radar; 1 passive sonar.
Armament: 10 heavyweight anti-submarine torpedo tubes (6 forward, 4 aft) with 22 torpedoes or 44 mines.
Top speed: 16 kt dived.
Range: 11,000 nautical miles at 8 kt dived using snorkel.
Programme: 60 of these vessels were built between 1957 and 1974.
Notes: In many respects directly comparable to the Royal Navy's Porpoise/Oberon class contemporaries, the Foxtrot class remains in front line with Mediterranean and Indian Ocean-based units of the Soviet fleet. While these ageing diesel-electric driven Foxtrots may be significantly slower than the subsequent generations of nuclear-powered submarines, their retention in service reflects the respect many senior submariners have for these very silent when running submersed hunter/killers. Here, it should be remembered that one of the biggest problems facing nuclear-powered submarine designers is how effectively to muffle all the heat-exchanging steam plumbing. Eight Foxtrots have been transferred to the Indian Navy, 3 to Libya and several to Cuba.

Sauro class

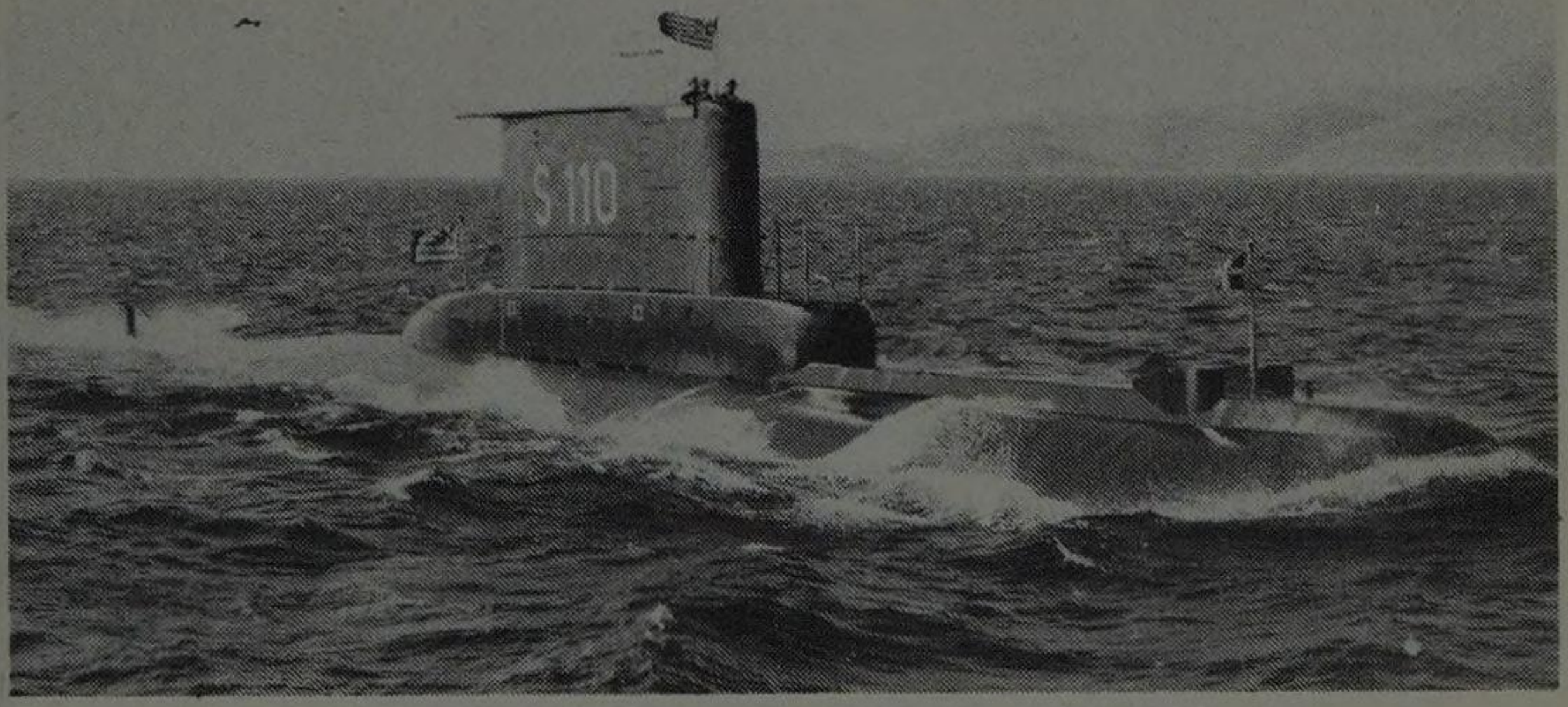
Submarines



Leonardo Da Vinci (S520) Sauro class submarine, 1981.

Role: Patrol.
Builder: CRDA Malfoncone, Italy.
User: Italian Navy.
Basic data: 1,641 t dived displacement; 209.5 ft (63.85 m) overall length; 22.4 ft (6.83 m) maximum beam. **Crew**: 45.
Propulsion: 3 GMT A210 16M diesel generators (total 2,160 KW)/batteries/electric motor; 1 propeller.
Sensors: 1 SMG RM-20 radar; Selenia USEA IPD-70 sonar system; 1 Velox M5 sonar.
Armament: 6 tubes for heavyweight torpedoes (6 reloads carried).
Top speed: 20 kt dived.
Range: 12,500 nautical miles dived at 4 kt using snorkel.
Programme: The initial Italian Government contracts covered 2 boats, *Nazario Sauro* (S518) and *Carlo Fecia di Cossato* (S519), ordered in 1974 and 1975 respectively, and which entered service in 1979 and 1980. Two more of this class, *Leonardo Da Vinci* (S520) and *Guglielmo Marconi* (S521), were ordered in 1977 and both entered service during the latter half of 1981.
Notes: Designed with the export market very much in mind, the Sauro class boats employ Italian equipment exclusively in their construction. Capable of diving to a sustained depth of around 820 feet, the Sauro class can travel submerged at top speed for up to 1 hour, or up to 100 hours at 4 knots. However, to do this requires the submarine to run its diesels periodically, which, in turn, necessitates approaching the surface to 'snorkel'.

Type 209 class Submarines

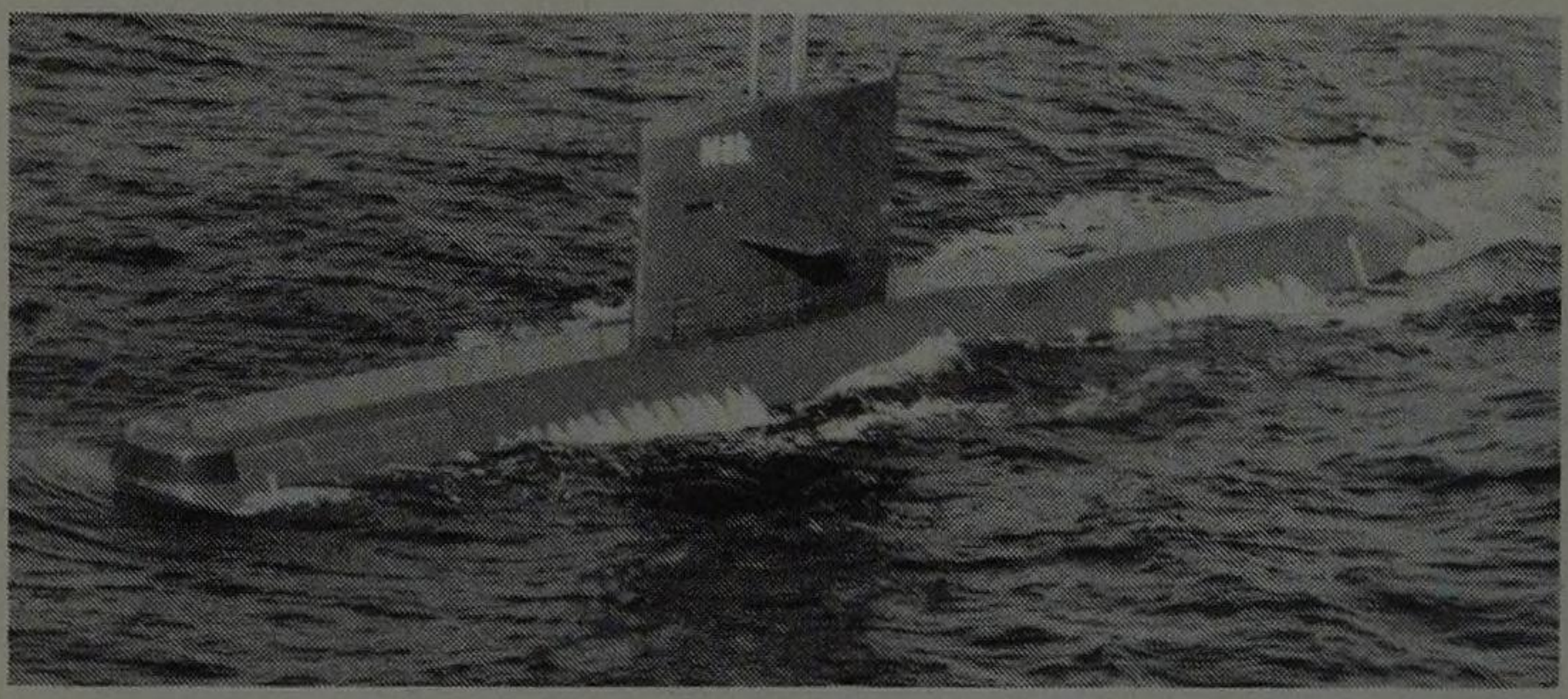


The Hellenic Navy's *Glavkos* (S110), lead boat of class.

Role: Patrol. **Builder**: Howaldtswerke, Federal Germany.
Users: Navies of Argentina, Ecuador, Greece, Indonesia, Peru, Turkey and Venezuela.
Basic data: 1,230 t dived displacement; 180.4 ft (55 m) overall length; 21.65 ft (6.6 m) maximum beam. **Crew**: 31.
Propulsion: 4 MTU Type 12-V-492-Tb-90 diesels/batteries/ 1 Siemems electric motor (3,600 shp); 1 propeller.
Sensors: 1 Omega nav system; 1 of various surface search radars; 1 of various bow-mounted sonars.
Armament: 8 heavyweight anti-submarine torpedo tubes (14 torpedoes).
Top speed: 22 kt dived. **Range**: In excess of 50 days.
Programme: Greece placed the first order for the Type 209s in 1967, for 6 boats, since increased to 8; the first of the Greek submarines, *Glavkos* (S110), being accepted in September 1971 and the last during 1980. Further orders for the Type 209 followed quickly, with Argentina ordering 2, operated as **Salta class** boats, the first *Salta* (S31) being accepted in May 1974. Peru contracted for 3, the first of which, *Islay* (S45), was commissioned in January 1975. Turkey, with orders for 5, took delivery of their first boat, *Atilay* (S347), in July 1975. Venezuela has 4, their first, *Sabalo* (S31), being accepted into service in August 1976. Ecuador has also ordered 2 boats, the first being *Shyri*. Indonesia ordered 2 Type 209s in 1977.
Notes: The Type 209s can reach a depth in excess of 655 feet (200 metres), some later deliveries are 9.8 feet longer and 70 tons heavier dived. Characterised by the turtle deck section.

Nacken class

Submarines

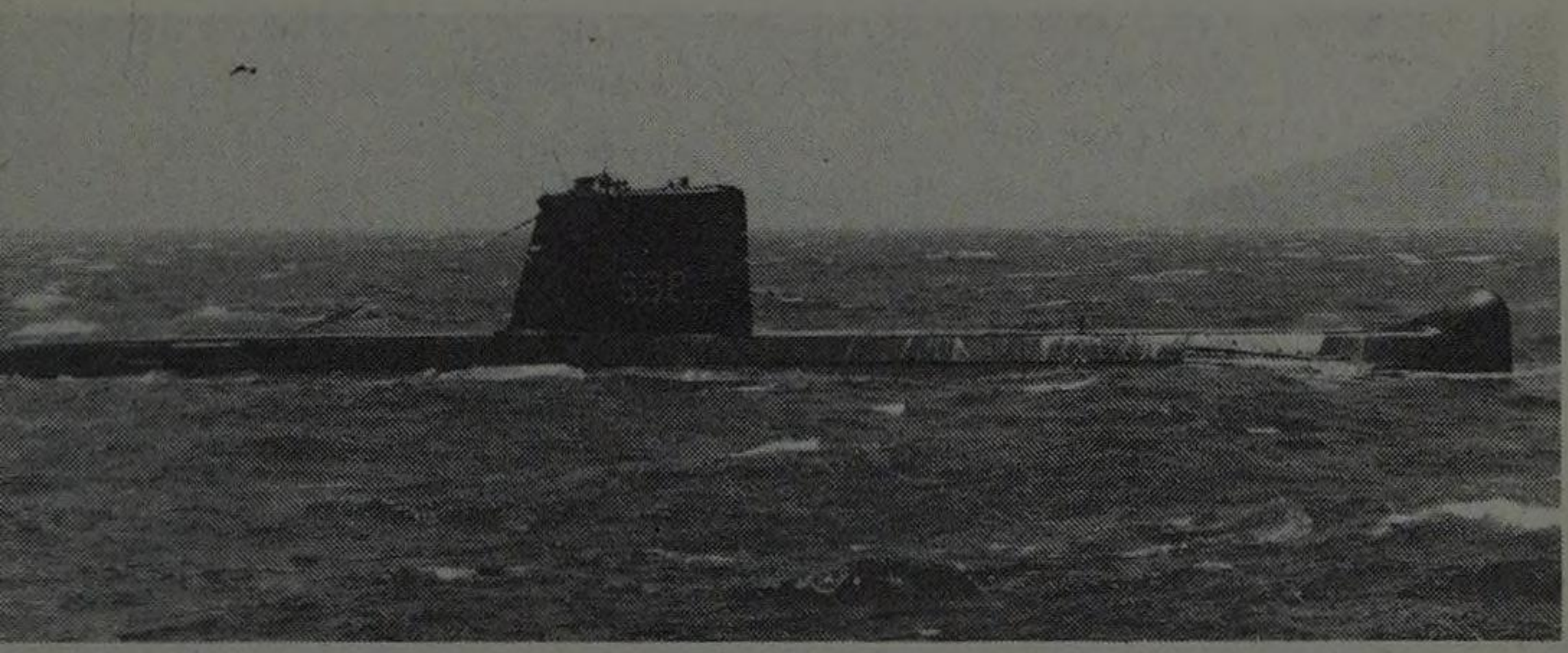


Nacken, lead ship of this 3 boat class.

Role: Patrol.
Builder: Kockums, Sweden.
User: Royal Swedish Navy.
Basic data: 1,125 t dived displacement; 162.4 ft (49.5 m) overall length; 20 ft (6.1 m) maximum beam. **Crew**: 19.
Propulsion: 2 Hedemora-Pielstick diesels/batteries/1 electric motor (1,500 shp); 1 propeller.
Sensors: 1 Philips (Sweden) surface search radar; 1 bow-mounted active/passive sonar system.
Armament: 6 heavyweight and 2 lightweight anti-submarine torpedo tubes; mines.
Top speed: 20 kt dived.
Range: In excess of 2,000 nautical miles.
Programme: Ordered in 1972, this 3 boat class comprises *Nacken* (Nak), *Najad* (Naj) and *Neptun* (Nep). Laid down between November 1972 and March 1974, *Nacken*, the first of the type A 14 boats, entered service during 1979, followed by the other 2 boats in 1980.
Notes: An extremely compact design, the Nacken class submarines have an almost full length turtle deck structure above the main cylindrical pressure hull and it is only the turtle decking that is visible when the craft is running on the surface, adding appreciably to the boat's apparent short overall length. The small crew complement is as much a reflection of the high degree of automation used in these boats, as it is a function of their relatively short design, tailored to meet Sweden's overall defensive, as opposed to offensive, military equipment procurement policies.

Daphne class

Submarines

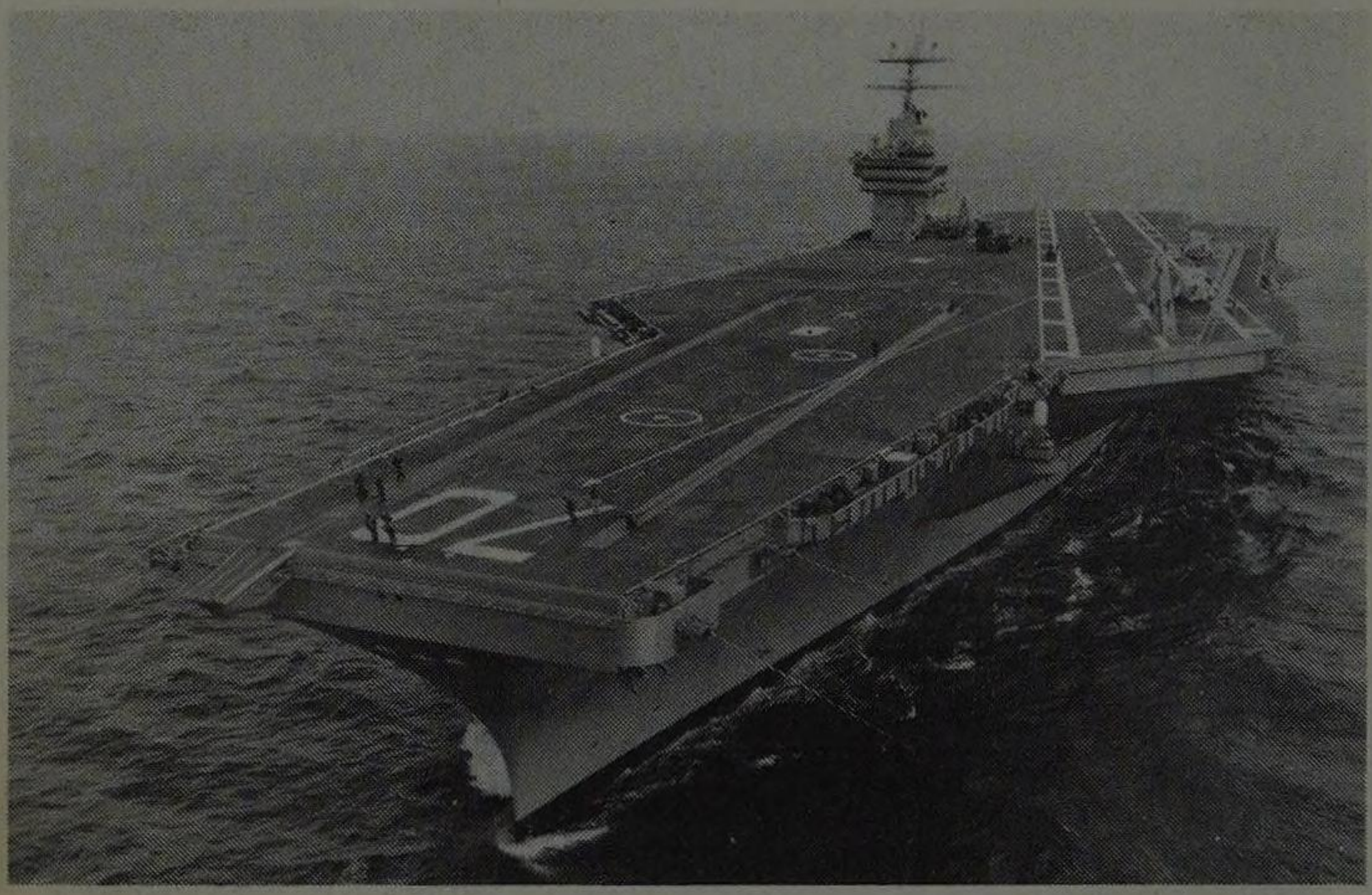


South African Navy's *Emily Hobhouse* (S98).

Role: Patrol. **Builders**: Various French; Bazan, Spain.
Users: Navies of France, Portugal, Pakistan, South Africa, Spain.
Basic data: 1,043 t dived displacement; 189.5 ft (57.75 m) overall length; 22.2 ft (6.76 m) maximum beam. **Crew**: 45.
Propulsion: 2 SEMT-Pielstick 450 KW diesel generators/batteries/electric motors; 2 propellers.
Sensors: 1 Calypso II radar; 1 DUUA 2 passive sonar (French fit).
Armament: 12 tubes for 12 heavyweight topedoes (no reserves).
Top speed: 16 kt dived.
Range: 4,500 nautical miles dived at 5 kt using snorkel.
Programme: 9 boats were built for the French Navy, all entering service between June 1964 and March 1970: *Daphne* (S641), *Diane* (S642), *Doris* (S643), *Flore* (S645). *Galatee* (S646), *Junon* (S648), *Venus* (S649), *Psyche* (S650) and *Sirene* (S651). Portugal operates 3: *Albacora* (S163), *Barracuda* (S164) and *Delfim* (S166). South Africa employs 3: *Maria Van Riebeeck* (S97), *Emily Hobhouse* (S98) and *Johanna Van der Merwe* (S99). Four more currently in service with Pakistan are: *Hangor* (S131), *Shushuk* (S132), *Mangro* (S133) and *Ghazi* (S134). The final 4 Daphnes to be built were constructed under licence by Bazan of Spain: *Delfin* (S61), *Tonina* (S62), *Marsopa* (S63) and *Narval* (S64); all entering into service between May 1973 and November 1975.
Notes: Capable of very quiet submerged running, this class of submarine can dive to depths of around 985 feet.

Nimitz class

Aircraft carriers

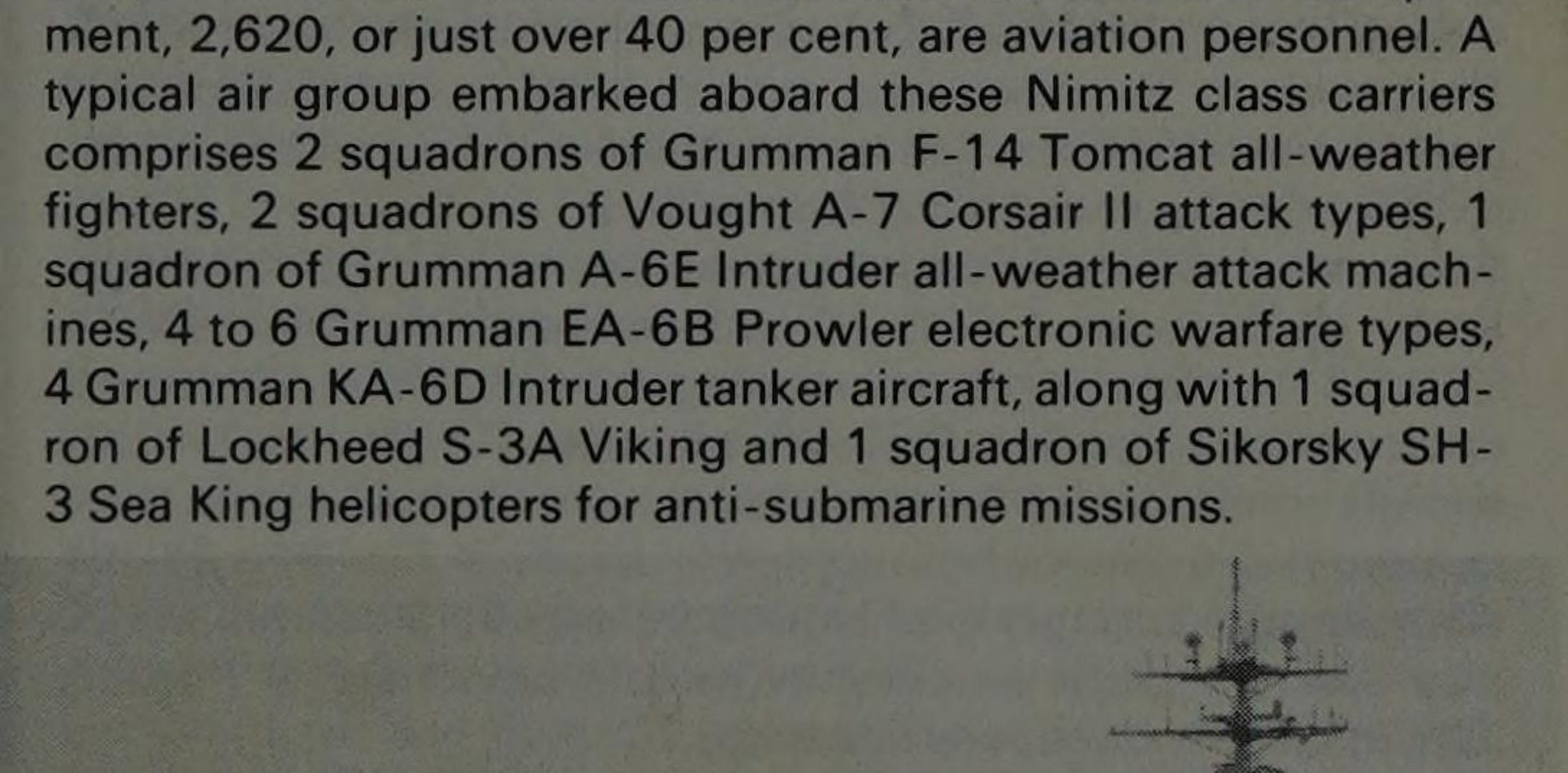


USS *Carl Vinson* (CVN70) on sea trials, January 1982.

Role: Air power projection. **Builder**: Newport News, USA.
User: US Navy.
Basic data: 93,405 t full displacement; 1,092 ft (332.8 m) overall length; 252 ft (76.8 m) maximum beam. **Crew**: 6,280.
Propulsion: 2 Westinghouse A4W pressurised water nuclear reactors powering steam turbines (total 280,000 shp); 4 propellers.
Sensors: Comprehensive suite of SPS-10 (surface) and SPS-43A or SPS-48 (air) long-range radars; 3 Mk 115 fire control radars (Mk 91 systems substituted in CVN 70 onwards); all integrated and managed by highly automated tactical action control systemry.
Armament: 1 air group of around 95 aircraft; 3 octuple-tube Sea Sparrow point defence surface-to-air missile launchers; 3 Phalanx 20 mm rapid-fire gun close-in weapons systems (a 4th Phalanx is fitted to CVN 70 onwards).
Top speed: 32 kt. **Range**: Unlimited.
Programme: Originally conceived during the mid-1960s as a 3-ship class to replace the Midway carriers, the contract for the lead ship, USS *Nimitz* (CVN68), was placed in 1967, the next two ships, USS *Dwight D. Eisenhower* (CVN69) and USS *Carl*

Vinson (CVN70), being ordered in 1970 and 1974, respectively. *Nimitz* entered service in May 1975, followed by CVN 69 in late 1977 and CVN70 in 1982. An order for a fourth Nimitz class ship, USS *Theodore Roosevelt* (CVN71), was placed in late 1980, with delivery planned for 1987. US Navy plans make provision for a 5th and 6th Nimitz class ship.

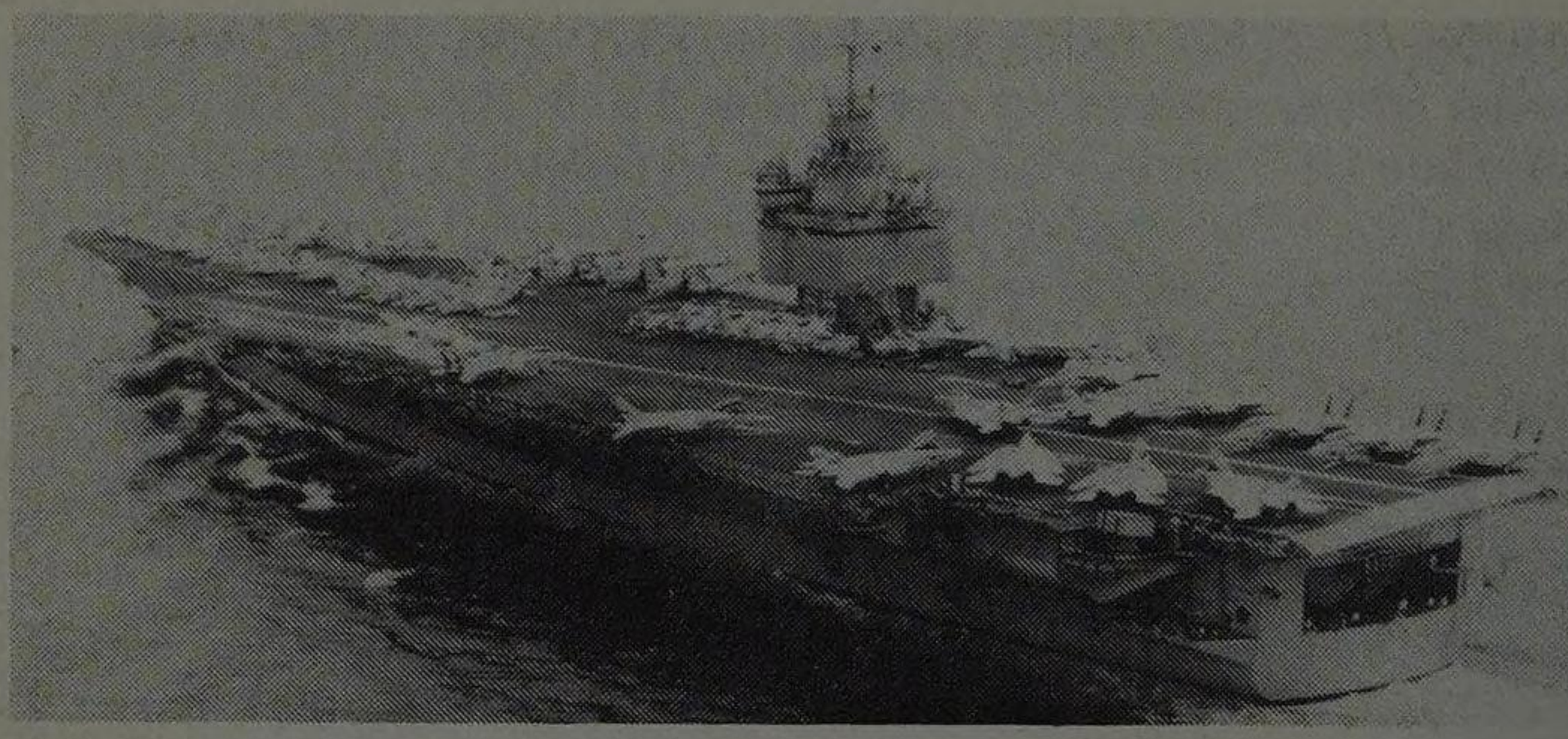
Notes: Second only in size and weight to a Uruguayan Navy-operated 145,000 ton supertanker, the Nimitz class carriers embody a 4.5 acre flightdeck layout based on that of the earlier, conventionally-powered Kitty Hawk class, while the Nimitz class's nuclear reactor system is a much refined development of the 8 reactor installation used to power the USS *Enterprise* (CVN65), America's first nuclear-powered carrier. The nominal 13-year useful life of the Nimitz class's nuclear fuel rods provides the energy equivalent to 11 million barrels of fuel oil, giving the ships the ability to sail unrefuelled for between 800,000 and 1 million nautical miles. Of the total crew complement, 2,620, or just over 40 per cent, are aviation personnel. A typical air group embarked aboard these Nimitz class carriers comprises 2 squadrons of Grumman F-14 Tomcat all-weather fighters, 2 squadrons of Vought A-7 Corsair II attack types, 1 squadron of Grumman A-6E Intruder all-weather attack machines, 4 to 6 Grumman EA-6B Prowler electronic warfare types, 4 Grumman KA-6D Intruder tanker aircraft, along with 1 squadron of Lockheed S-3A Viking and 1 squadron of Sikorsky SH-3 Sea King helicopters for anti-submarine missions.



USS *Dwight D. Eisenhower* (CVN69), September 1981.

Enterprise type

Aircraft carriers

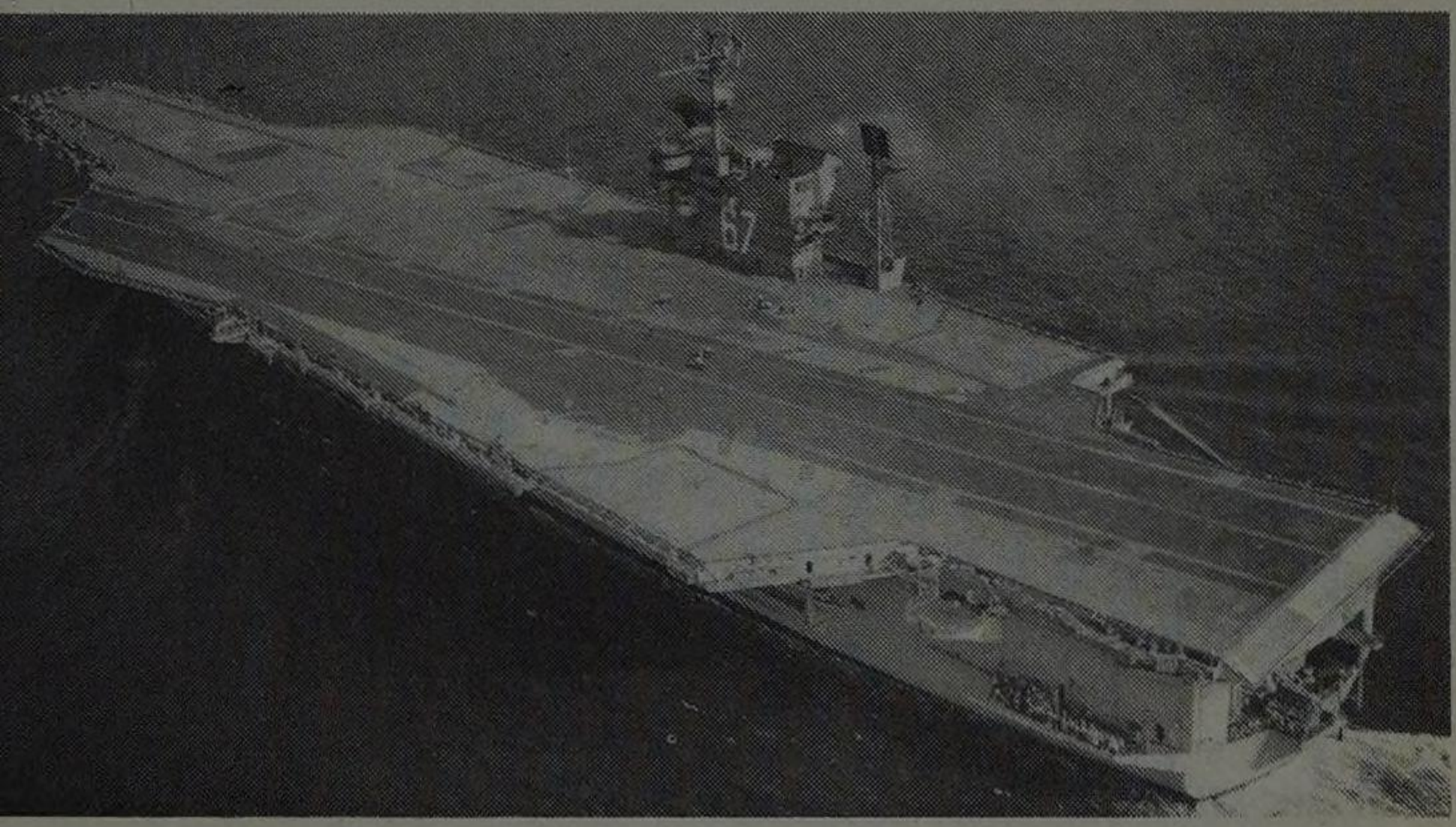


USS *Enterprise* (CVN65) departing San Diego, June 1976.

Role: Air power projection. **Builder**: Newport News, USA.
User: US Navy.
Basic data: 89,600 t full displacement; 1,123 ft (342.3 m) overall length; 248.3 ft (75.7 m) maximum beam. **Crew**: 5,785.
Propulsion: 8 pressurised water A2W nuclear reactors/4 geared steam turbines (all by Westinghouse) providing a total of 280,000 shp and driving 4 propellers.
Sensors: 1 SPS-49 long-range air search; 1 SPS-48 height finder (3-D) radar; 1 SPS-10 surface search and nav radar; 1 SPS-65 low-level air threat warning radar; 3 Mk 91 fire control radar systems for Sea Sparrow missiles; 1 URN-20 TACAN aircraft homer; 1 NTDS automated action information data processor.
Armament: 1 air group of around 90 aircraft; 3 octuple Mk 29 Sea Sparrow point air defence missile launchers; 3 Phalanx 20 mm close-in weapons systems.
Top speed: 31 kt. **Range**: Unlimited.
Programme: The USS *Enterprise* (CVN65) is the sole example of her type, being ordered in 1958, launched in September 1960 and commissioned in November 1961. *Enterprise*'s latest refit was completed in 1981, involving major refurbishment including the replacement of the earlier SPS-32 amd SPS-33 fixed array radars.
Notes: Essentially a Kitty Hawk class hull modified to serve as an operational prototype for the Nimitz class nuclear-powered carriers, the 'Big E' as the ship is known by her crew carries 2,628 people specifically associated with aircraft operations.

Kitty Hawk class

Aircraft carriers



USS *John F. Kennedy* at sea in July 1968.

Role: Air power projection. **Builders**: Various, USA.
User: US Navy.
Basic data: 80,800 t full displacement; 1,062.5 ft (323.9 m) overall length; 250 ft (76.2 m) maximum beam. **Crew**: 5,380.
Propulsion: 4 Westinghouse geared steam turbines (total 280,000 shp); 4 propellers.
Sensors: 1 SPS-49 long-range air search radar; 1 SPS-48 height finder (3-D) radar; 1 SPS-10B surface search and nav radar; 2 Mk 91 missile fire control systems; 1 URN-22 TACAN aircraft homer; 1 SQS-23 bow-mounted sonar (in CV66 only); 1 NTDS automated action information data processing system.
Armament: 1 air group of around 85 aircraft; 2 octuple Mk 29 launchers for Sea Sparrow point air defence missiles in CV63, CV66 and CV67, while CV64 has 2 twin Mk 10 launchers for Terrier area air defence missiles; 3 Phalanx 20 mm close-in weapons systems.
Top speed: 33 kt. **Range**: 8,000 nautical miles at 20 kt.
Programme: A 4 ship class comprising: USS *Kitty Hawk* (CV63), USS *Constellation* (CV64), USS *America* (CV66) and USS *John F. Kennedy* (CV67); commissioned in April 1961, October 1961, January 1965 and September 1968, respectively.
Notes: Developed from the Forrestal class, the Kitty Hawks' air group includes a squadron of S-3A Viking anti-submarine aircraft and requires around 2,500 aviation dedicated personnel.

Forrestal class

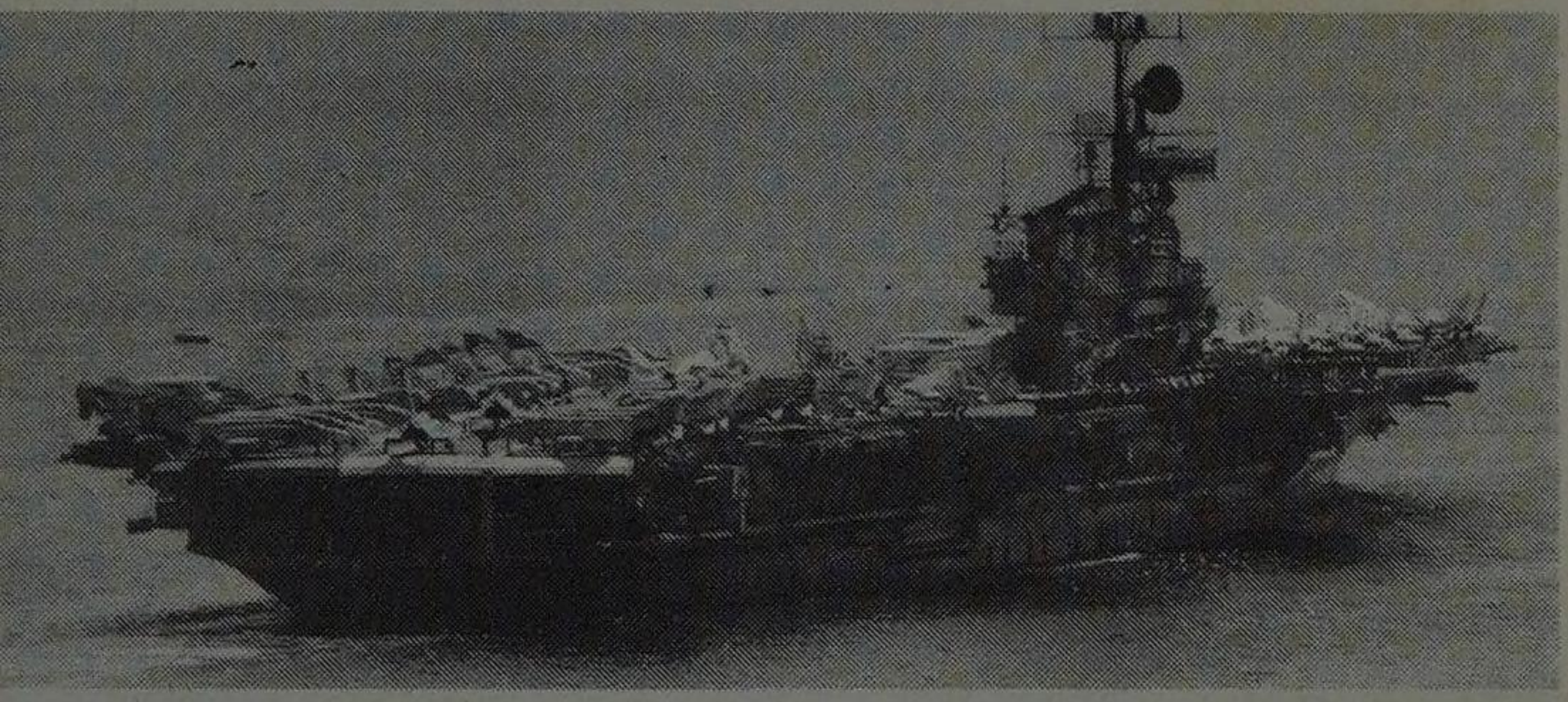
Aircraft carriers

USS *Forrestal* (CV59) at sea in December 1975.

Role: Air power projection.
User: US Navy.
Builders: Various, USA.
Basic data: 78,000 t full displacement; 1,039 ft (316.7 m) overall length; 238 ft (72.5 m) maximum beam. **Crew**: 5,390.
Propulsion: 4 Westinghouse geared steam turbines (total 280,000 shp); 4 propellers.
Sensors: 1 SPS-43A (SPS-49 to be retrofitted) long-range air search radar; 1 SPS-48 height finder (3-D) radar; 1 SPS-58 low-level air threat warning radar; 1 SPS-10 surface search and nav radar; 2 Mk 91 fire control radar systems for Sea Sparrow; 1 URN-22 TACAN aircraft homer; NTDS automated action information data processor.
Armament: 1 air group of up to 85 aircraft. Ships have or are being fitted with 2 octuple Mk 25 or 29 launchers for Sea Sparrow point air defence missiles. Three Phalanx 20 mm close-in weapons systems are being fitted as they become available.
Top speed: 32 kt. **Range**: 8,000 nautical miles at 20 kt.
Programme: This 4 ship class comprises: USS *Forrestal* (CV59), USS *Saratoga* (CV60), USS *Ranger* (CV61) and USS *Independence* (CV62); the 1st and 3rd ships being built by Newport News, while the 2nd and 4th being constructed by the New York Naval Dockyard. Commissioning dates: October 1955, April 1956, August 1957 and January 1959, respectively. All are to undergo Service Life Extension Programme (SLEP) during the 1980s to provide an extra 15 years of useful service, work having started on *Saratoga*.
Notes: These were the first post-World War II US carriers.

Midway class

Aircraft carriers



USS *Midway* (CV41) entering the Mediterranean.

Role: Air power projection. **Builder**: Newport News, USA.
User: US Navy.
Basic data: 64,000 t full displacement; 979 ft (298.4 m) overall length; 258.5 ft (78.8 m) maximum beam. **Crew**: 4,560.
Propulsion: 4 Westinghouse geared steam turbines (total 212,000 shp); 4 propellers.
Sensors: 1 SPS-49 long-range air search radar; 1 SPS-48 height finder (3-D) radar; 1 SPS-10 surface search radar; 2 Mk 115 missile fire control system radars; NTDS automated action information data processing.
Armament: 1 air group of up to 72 aircraft; 2 octuple Mk 25 Sea Sparrow point air defence missile launchers; 2 Phalanx 20 mm close-in weapons systems.
Top speed: 32 kt. **Range**: In excess of 12,000 nautical miles.
Programme: Originally a 3 ship class comprising USS *Midway* (CV41), USS *Franklin D. Roosevelt* (CV42) and USS *Coral Sea* (CV43), of which only *Midway* and *Coral Sea* remain in service. Commissioned in September 1945 and October 1947, respectively, the ships have undergone major modernisation during the late 1950s and, in the case of the *Midway*, again in the late 1960s. Both ships will stay in service through the 1980s.
Notes: Too late to see service in World War II, these ships were the largest aircraft carriers of their time. Although their flight deck is not sufficiently stressed to operate the heavy Grumman F-14 Tomcat, they can and do operate McDonnell F-4 Phantoms.

Kiev class

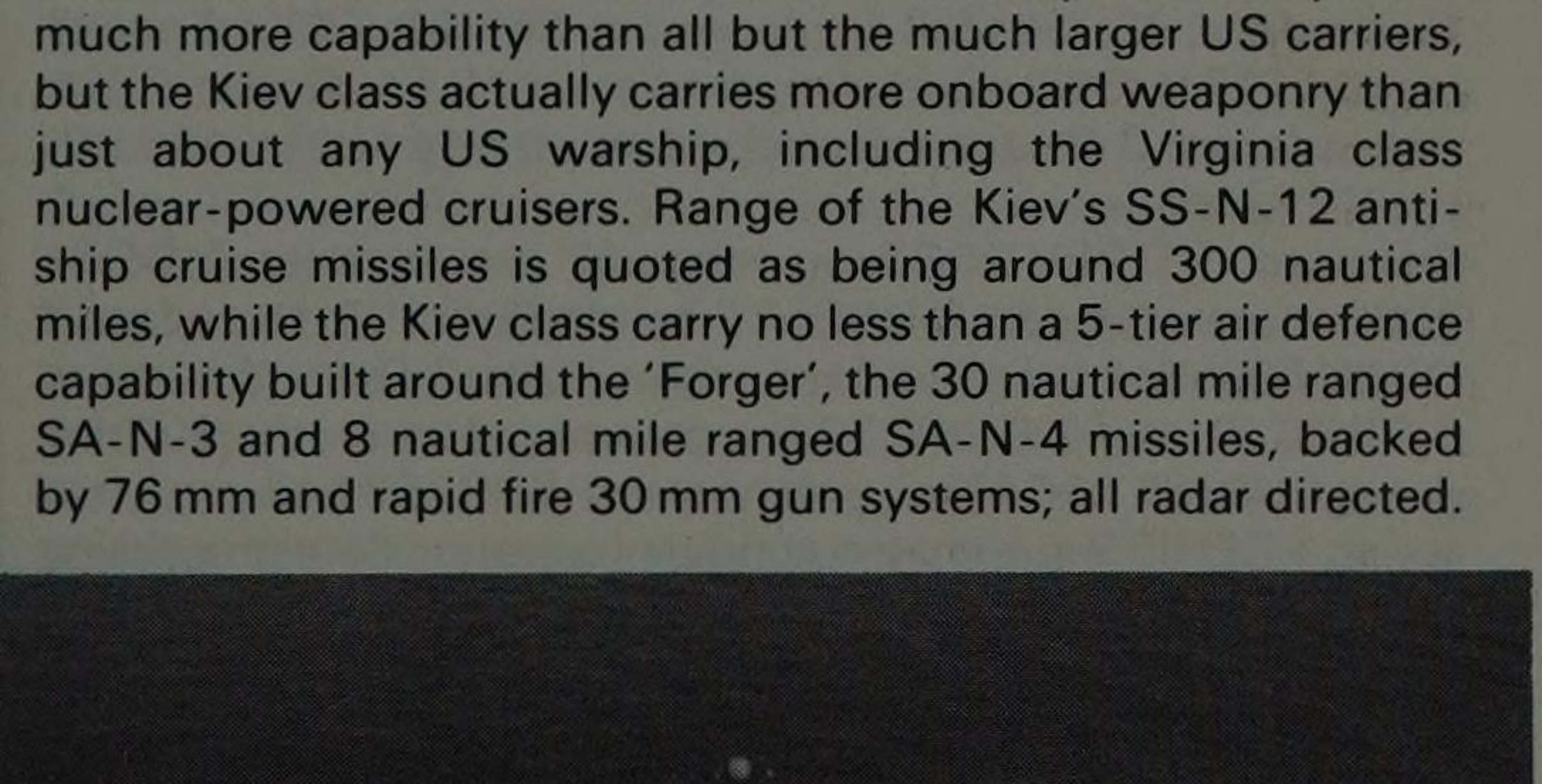
Aircraft carriers

Kiev with 2 Yak-36 and 7 Ka-25s on flight deck, 1976.

Role: Fleet air defence. **Builder**: Nikolayev, USSR.
User: Soviet Navy.
Basic data: 37,000 t full displacement; 900 ft (270 m) overall length; 164 ft (50 m) maximum beam. **Crew**: 1,700.
Propulsion: 4 geared steam turbines (total 140,000 shp); 4 propellers.
Sensors: 1 long-range air search radar; 2 separate height finder (3-D) radars (one probably for ship-controlled interception); 2 surface search and nav radars; 2 fire control radars each for the SA-N-3 and SA-N-4 missile systems; 1 fire control radar for the SS-N-12 missile system; 2 fire control radars for the 76 mm guns; 4 fire control radars for the 30 mm Gatling guns; 1 hull-mounted and 1 towed variable depth sonar.
Armament: Typically 12 Yakolev Yak-36 VTOL strike fighters and 24 Kamov Ka 25 helicopters; 4 twin SS-N-12 anti-ship cruise missile launchers; 2 twin SA-N-3 area air defence missile launchers; 2 twin SA-N-4 short-range air defence missile launchers; 1 twin SUW-N-1 short-range anti-submarine missile launcher; 2 twin 76 mm dual-purpose guns; 8 single 30 mm Gatling anti-aircraft guns.
Top speed: 32 kt. **Range**: 13,500 nautical miles at 18 kt.
Programme: The first of this 4 known ship class, *Kiev*, was laid down in September 1970 and accepted into service in May 1975; a second ship, *Minsk*, followed on to the stocks in December 1972 and was accepted in February 1978. The third ship, *Kharkov*, laid down in October 1975, should now be in

service, with a fourth carrier, *Novorossiysk*, near to completion, if not already accepted.

Notes: The Kiev class ships are not only the largest Soviet warships yet to enter service, but with their complement of vertical take-off and landing (VTOL) Yakolev Yak-36 'Forger' strike fighters, these ships provide the Soviet Navy with a quantum jump in seagoing air capability. Unlike the earlier Moskva class helicopter cruisers, the Kiev class must be seen as real aircraft carriers, particularly when viewed in the light of recent successful operational deployment of the smaller HMS *Invincible* in the South Atlantic. Considering the previous total lack of Soviet Navy fixed winged, carrier-going aircraft operating experience, the apparently trouble-free deployment of the just supersonic Yakolev Yak-36 is particularly notable, as is the exceptionally heavy and well-balanced sensors/weapons fit installed aboard these ships. Indeed, in terms of both offensive and defensive armament, the Kiev class ships not only have much more capability than all but the much larger US carriers, but the Kiev class actually carries more onboard weaponry than just about any US warship, including the Virginia class nuclear-powered cruisers. Range of the Kiev's SS-N-12 anti-ship cruise missiles is quoted as being around 300 nautical miles, while the Kiev class carry no less than a 5-tier air defence capability built around the 'Forger', the 30 nautical mile ranged SA-N-3 and 8 nautical mile ranged SA-N-4 missiles, backed by 76 mm and rapid fire 30 mm gun systems; all radar directed.



Minsk in the Mediterranean, March 1979.

Clemenceau class

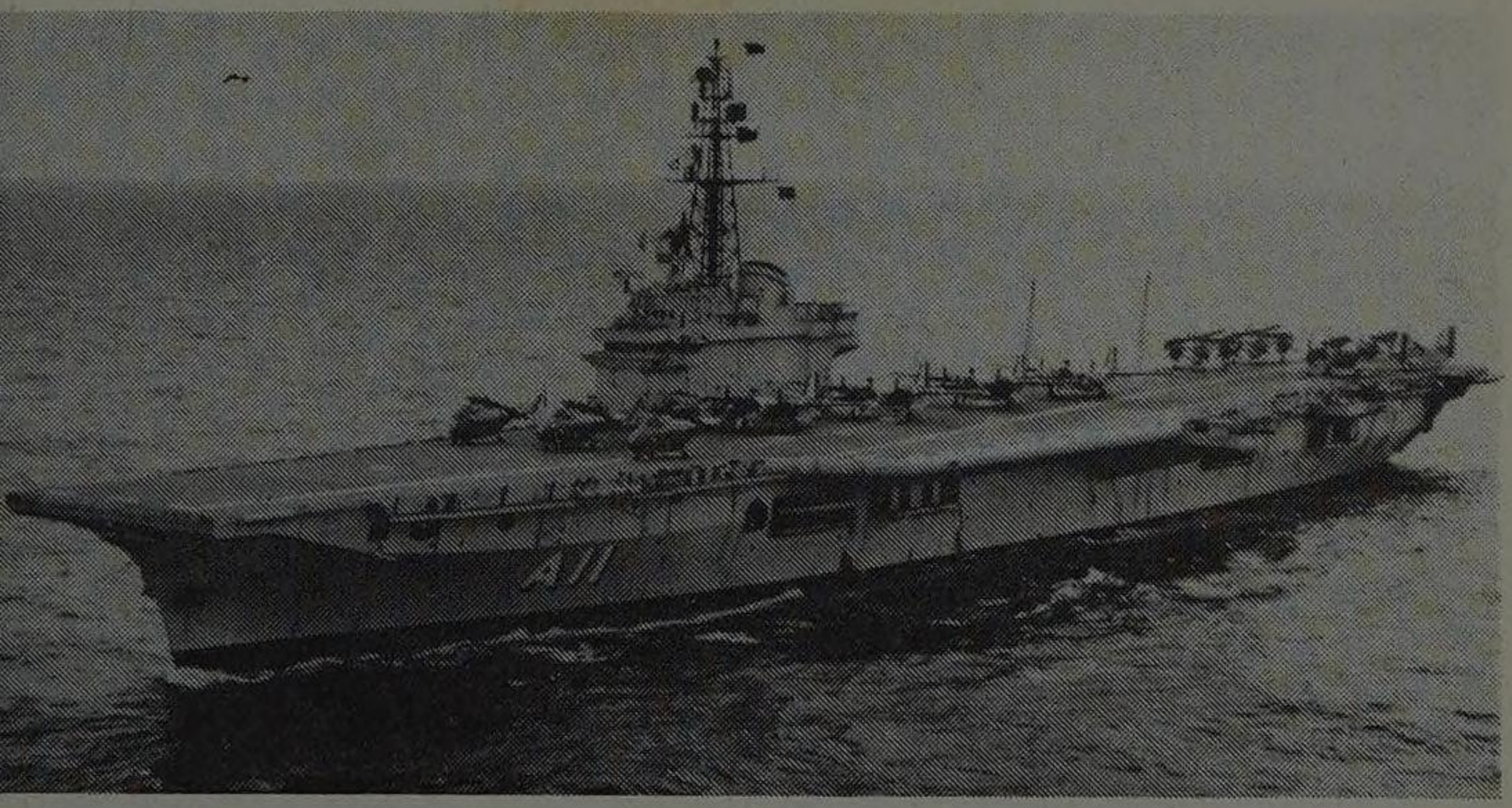
Aircraft carriers

Clemenceau (R98) of the French Navy, 1976.

Role: Air power projection. **Builders**: Various, France.
User: French Navy.
Basic data: 32,780 t full displacement; 869.4 ft (265 m) overall length; 168 ft (51.2 m) maximum beam. **Crew**: 1,338.
Propulsion: 2 Parsons geared steam turbines (total 126,000 shp); 2 propellers.
Sensors: 1 DRBV 20C long-range air search radar; 1 DRBV 23B air search radar; 2 DRBI 10 height finder (3-D) radars; 1 DRBV 50 low-level air and sea search radar; 1 Decca nav radar; 3 DRBC 31 and 2 DRBC 32 fire control radars for the 100 mm guns; 1 URN 6 TACAN aircraft homer; 1 SQS 505 hull-mounted sonar; 1 SENIT 2 automated action information data processing system.
Armament: 1 air group of around 40 aircraft; 8 single 100 mm Model 1953 dual-purpose guns.
Top speed: 32 kt. **Range**: 7,500 nautical miles at 18 kt.
Programme: This 2 ship class, made up of *Clemenceau* (R98) and *Foch* (R99), were authorised under the 1953 and 1955 French defence budgets and were accepted into service in November 1961 and July 1963, respectively. *Clemenceau* underwent a major refit betweeen late 1977 and late 1978, while *Foch* underwent a similarly extensive refit during 1980.
Notes: The normal air group embarked comprises 16 Super Etendards (strike), 3 Etendard IVP (reconnaissance), 10 F-8 Crusaders (fighters), 7 Alizes (anti-submarine) and 2 or 3 Alouette helicopters.

Minas Gerais type

Aircraft carriers

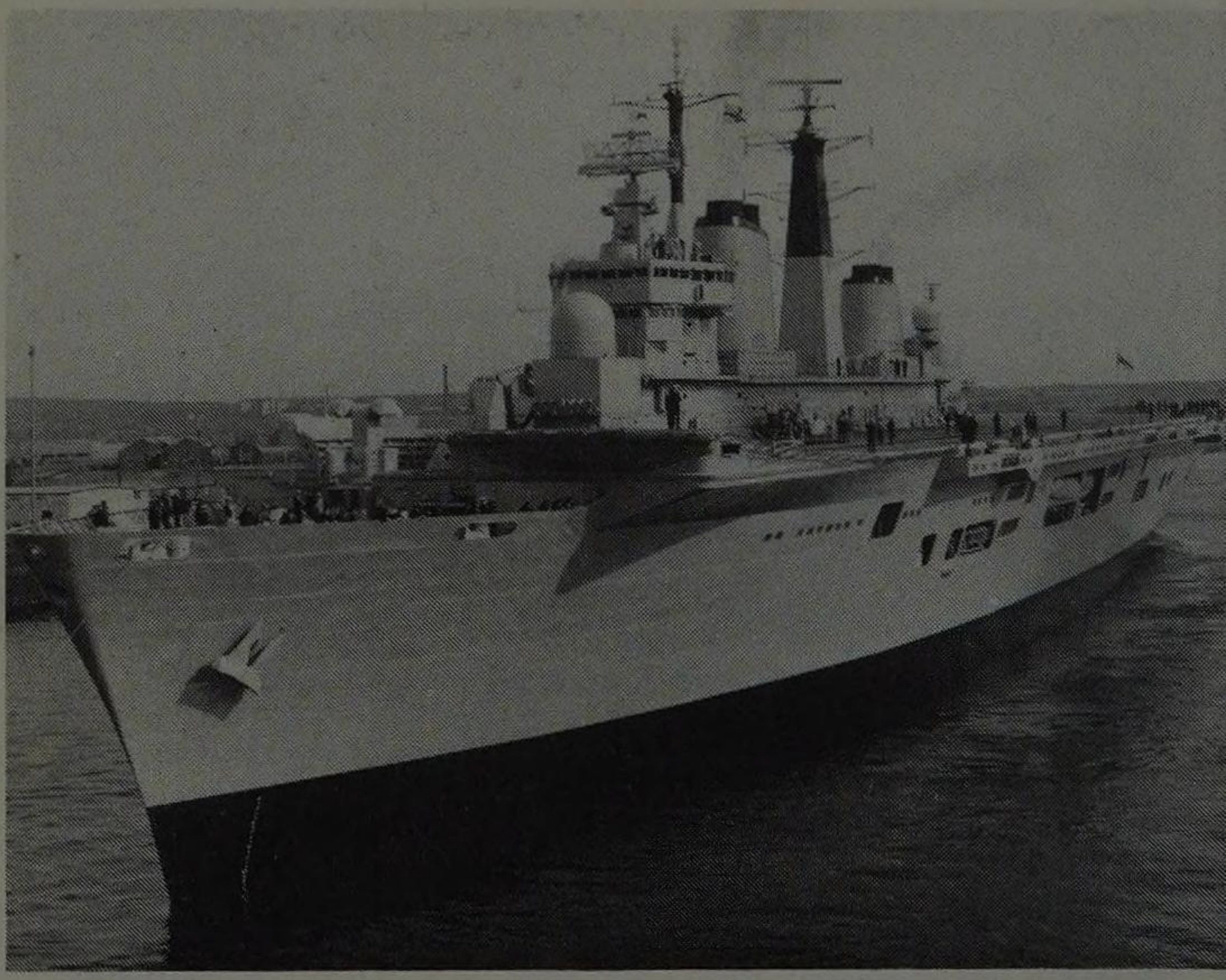


Minas Gerais (A11), a prime Brazilian anti-submarine asset.

Role: Anti-submarine. **Builder**: Swan Hunter, UK.
User: Brazilian Navy.
Basic data: 19,800 t full displacement; 693 ft (211.25 m) overall length; 119.5 ft (36.4 m) maximum beam. **Crew**: 1,300.
Propulsion: 2 Parsons geared steam turbines (total 42,000 shp); 2 propellers.
Sensors: 1 SPS-12 air search radar; 1 SPS-8B height finder radar; 1 SPS-4 surface search radar; 1 Type 1402 nav radar; 2 SPG-34 gun fire control radar; data link facilities.
Armament: 1 anti-submarine air group of 21 aircraft; 4 twin and 2 single 40 mm anti-aircraft guns.
Top speed: 24 kt. **Range**: 12,000 nautical miles at 14 kt.
Programme: Laid down in November 1942 as HMS *Vengeance*, a Colossus class carrier, the ship was bought by Brazil in November 1956 and entered service with the Brazilian Navy as the *Minas Gerais* (A11) in 1960, following a major modernisation carried out by a Dutch shipyard. The ship underwent refit between 1976 and 1979.
Notes: Unlike the Argentinian *25 de Mayo* (R81), another former Colossus class carrier, the *Minas Gerais* is now being operated in a dedicated anti-submarine role working closely with other naval units led by the Niteroi class frigates, with whom the carrier has data links. In its current role, the *Minas Gerais* operates 7 fixed winged Grumman S-2 Trackers and up to 13 Sikorsky SH-3 Sea King helicopters.

Invincible class

Aircraft carriers



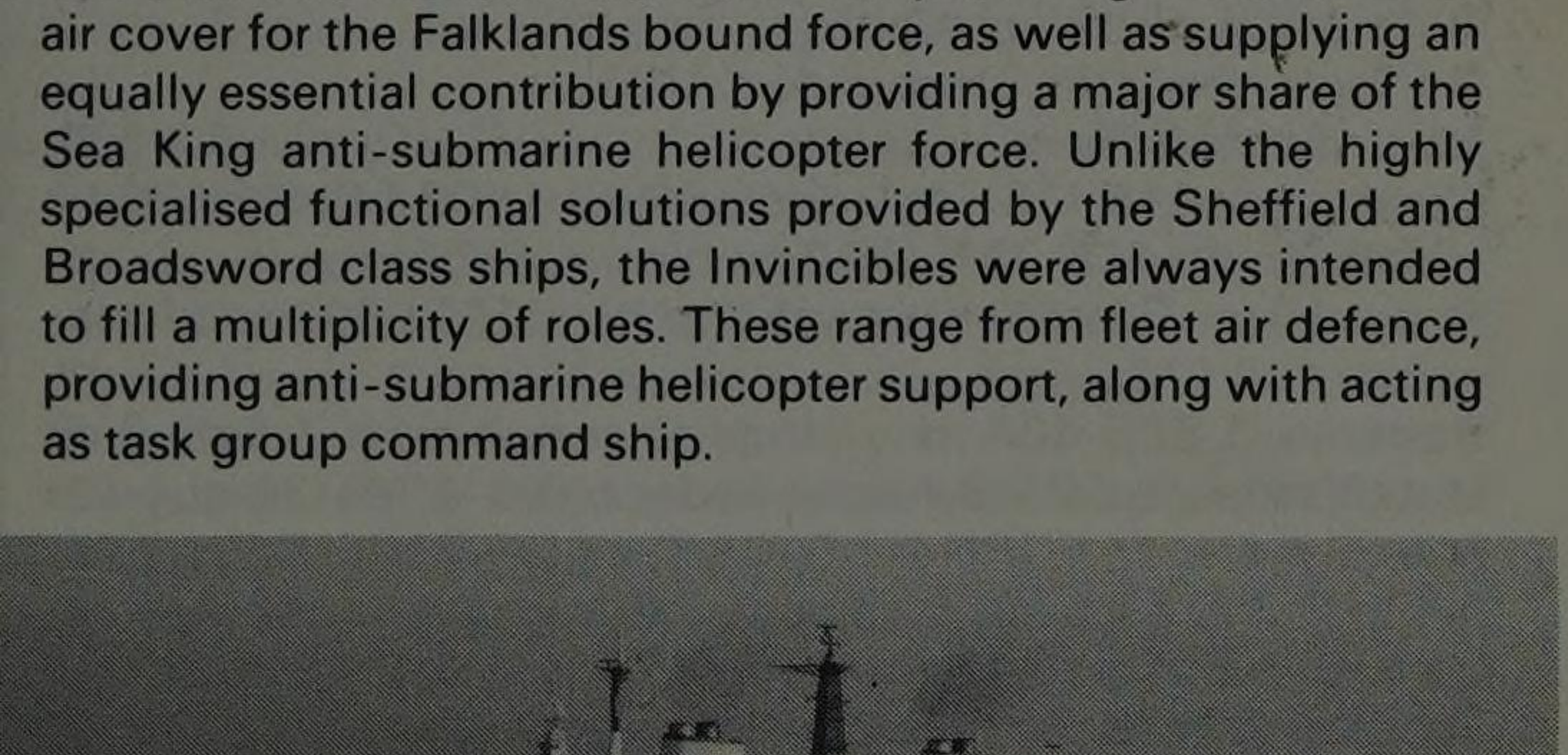
HMS *Invincible* (R05) just prior to acceptance, 1980.

Role: Multi-purpose. **Builders**: Various, UK.
User: Royal Navy.
Basic data: 19,500 t full displacement; 677.8 ft (206.6 m) overall length; 90.2 ft (27.5 m) maximum beam. **Crew**: 903.
Propulsion: 4 Rolls-Royce TM3B Olympus gas turbines (total derated 79,200 shp); COGAG; 2 c-p propellers.
Sensors: 1 Type 1022 long-range air search radar; 1 Type 922 low-level air and sea search radar; 1 Type 1006 nav radar; 2 Type 909 missile fire control radars; 1 Type 184 hull-mounted sonar; ADAWS 5 automated action information data processing.
Armament: 1 air group of, typically, 14 aircraft; 1 twin Mk 30 launcher for Sea Dart area air defence missiles; being equipped with 2 Phalanx 20 mm close-in weapons systems.
Top speed: 28 kt. **Range**: 5,000 nautical miles at 18 kt.
Programme: This 3 ship class consists of HMS *Invincible* (R05), HMS *Illustrious* (R06) and HMS *Ark Royal* (R09).

Aircraft carriers

Ordered incrementally in April 1973, May 1976 and December 1978, the lead ship was constructed at Vickers' Barrow-in Furness yards, while the 2nd and 3rd ships were built at Swan Hunter on the Tyne. *Invincible* was commissioned in March 1980, followed by *Illustrious* in mid-1982 and *Ark Royal* in early 1983.

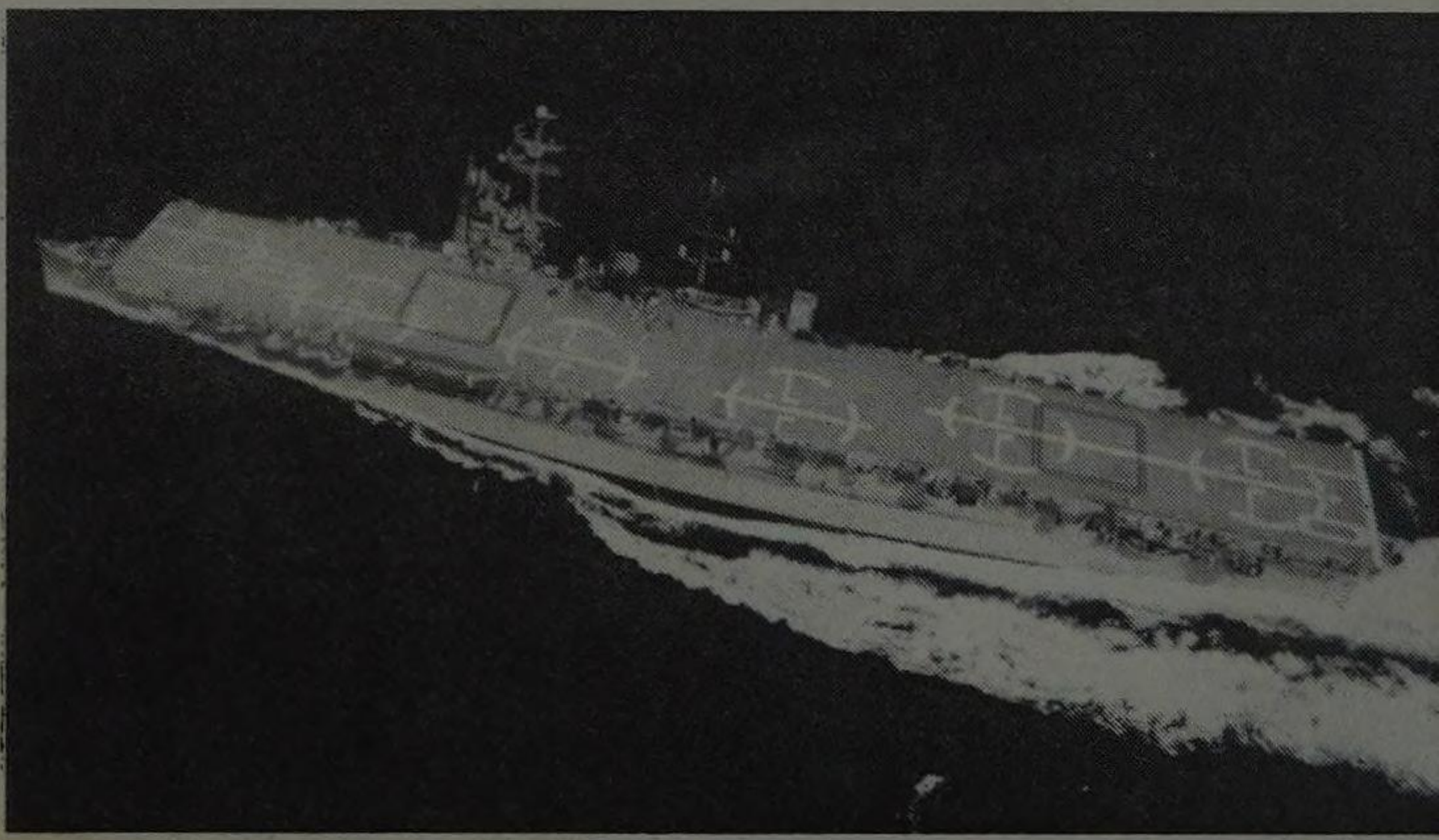
Notes: The history of these large, rather stark ships is one of extremely chequered fortunes right up until April 1982 when the existence of the lead ship, *Invincible*, alone made the mounting of a British task force to the Falklands feasible. Prior to that point, these rather modestly sized VSTOL aircraft carriers had come in for a lot of criticism, particularly on grounds of cost (the 1st ship cost £175 million). Indeed, in March 1982, the UK Minister of Defence announced that *Invincible* was to be sold to the Royal Australian Navy in late 1983 as part of a general reduction in Royal Navy force levels. Within a space of less than two months *Invincible* was providing the initial vital air cover for the Falklands bound force, as well as supplying an equally essential contribution by providing a major share of the Sea King anti-submarine helicopter force. Unlike the highly specialised functional solutions provided by the Sheffield and Broadsword class ships, the Invincibles were always intended to fill a multiplicity of roles. These range from fleet air defence, providing anti-submarine helicopter support, along with acting as task group command ship.



A helicopter pilot's eye view of HMS *Illustrious* (R06).

Dedalo type

Aircraft carriers

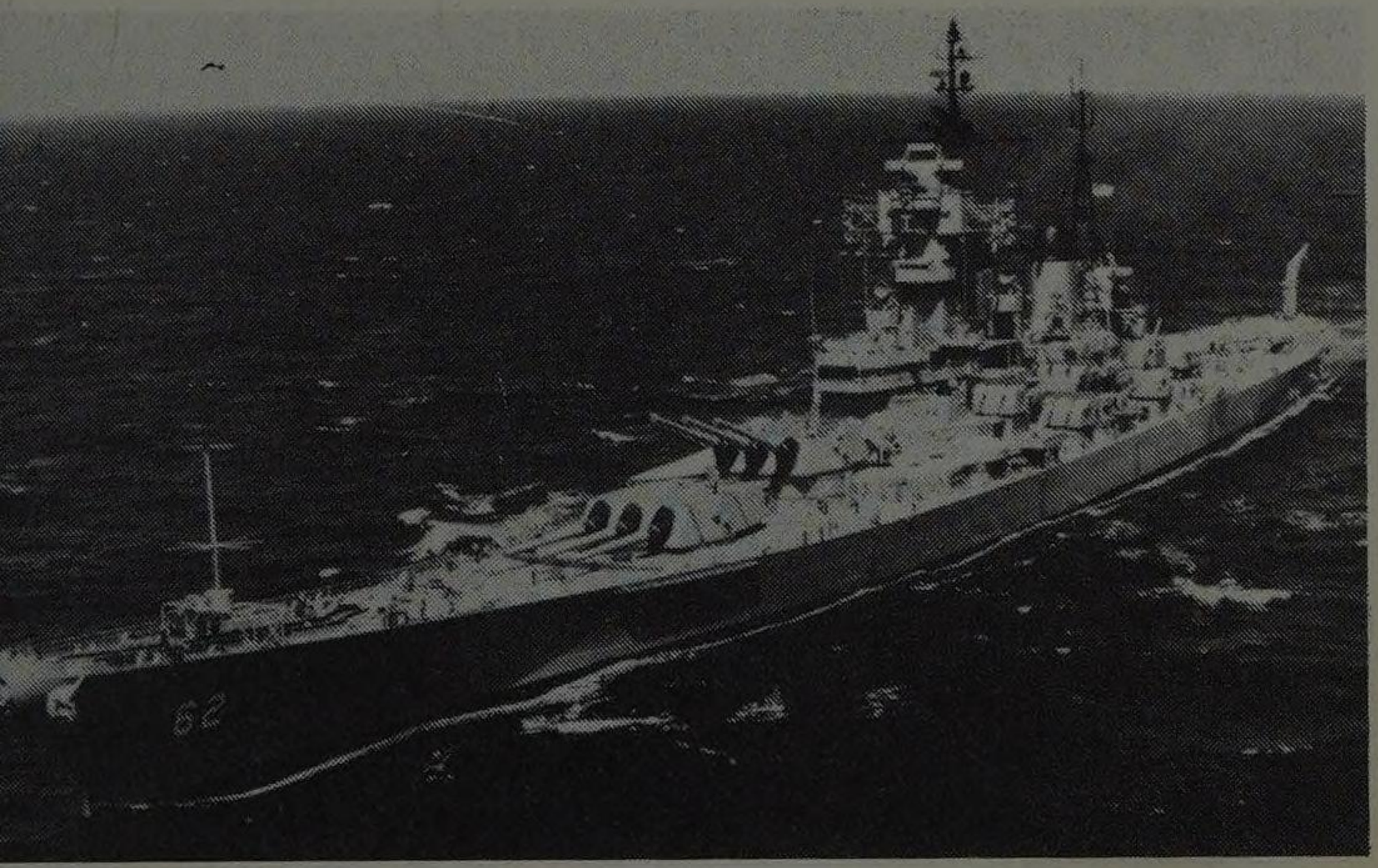


The Spanish carrier *Dedalo* in 1980.

Role: VTOL aircraft platform.
Builder: New York Shipbuilders, USA.
User: Spanish Navy. **Crew**: c. 1,500.
Basic data: 16,415 t full displacement; 622.5 ft (189.75 m) overall length; 109.25 ft (33.3 m) maximum beam.
Propulsion: Geared steam turbines (total 100,000 shp); 4 propellers.
Sensors: 1 SPS-40A long-range air search radar; 1 SPS-6 air search radar; 1 SPS-8 height finder radar; 4 Mk 34 gun fire control systems; 1 URN-22 TACAN.
Armament: Around 20 aircraft, comprising a mix of 6 Matadors (Harriers), 3 or 4 Sikorsky SH-3 Sea Kings and around 10 light helicopters; 2 quadruple and 9 twin 40 mm anti-aircraft guns.
Top speed: 30 kt. **Range**: 7,200 nautical miles at 15 kt.
Programme: The *Dedalo* (PA01) started life as a light cruiser (CL79), ordered 1940. During 1942, CL79 was one of several hulls converted into Independence class light carriers, being redesignated as USS *Cabot* (CVL28), which joined the US Navy in July 1943. The ship was transferred to the Spanish Navy in August 1967.
Notes: Old enough to have been damaged by a *Kamikaze* attack off Luzon in late 1944, it became only the second operational Harrier carrier.

Iowa class

Battleships



USS *New Jersey* (BB62) prior to current modernisation.

Role: Power projection. **Builders**: Navy Dockyards, USA.
User: US Navy. **Crew**: c. 1,620
Basic data: 57,500 t full displacement; 887.6 ft (270.5 m) overall length; 108.2 ft (33 m) maximum beam.
Propulsion: 4 geared steam turbines (total 212,000 shp); 4 propellers.
Sensors: 1 SPS-49 long-range air search radar; 1 SLQ-32 electronics warfare suite.
Armament: Facilities for up to 4 Sikorsky SH-60 Seahawk helicopters; 8 quadruple Tomahawk cruise missile launchers; 4 quadruple Harpoon anti-ship missile launchers; 3 triple 16 inch guns; 4 Phalanx 20 mm close-in weapons systems, as currently being installed.
Top speed: 33 kt. **Range**: 16,000 nautical miles at 15 kt.
Programme: Planned as a 6 ship class, only 4 were completed: USS *Iowa* (BB61), USS *New Jersey* (BB62), USS *Missouri* (BB63) and USS *Wisconsin* (BB64); all 4 being commissioned between February 1943 and April 1944. All 4 ships are being refurbished, with USS *New Jersey* recommissioning in January 1983.
Notes: The Iowa class will retain their big guns for long-range shore bombardment.

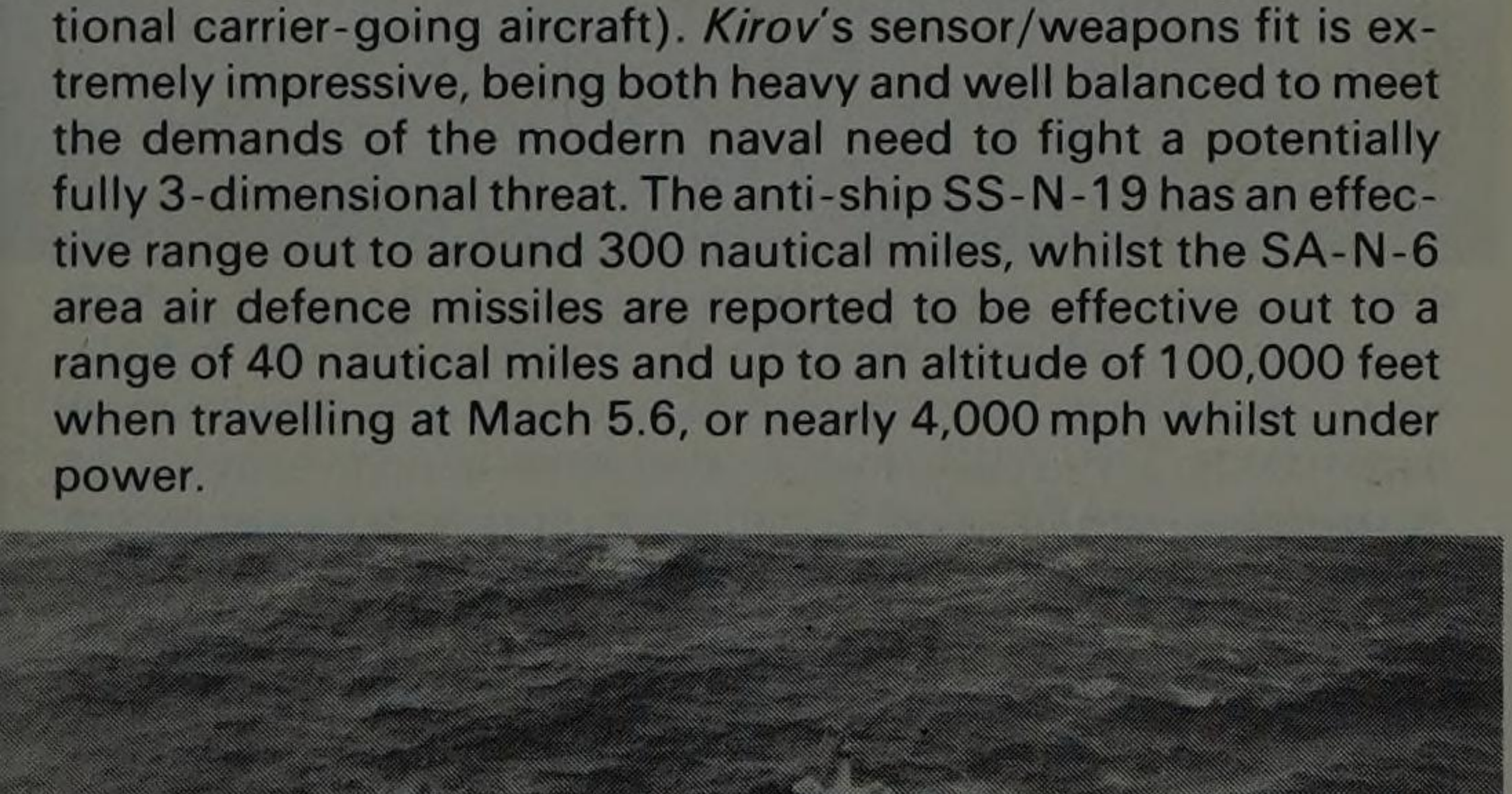
Kirov class

Kirov undergoing builder's trials, October 1980.

Role: General-purpose.
Builder: Baltic Yard, Leningrad, USSR.
User: Soviet Navy.
Basic data: c. 23,000 t full displacement; 810 ft (245 m) overall length; 91.85 ft (28 m) maximum beam. **Crew**: c. 900.
Propulsion: Reported to be provided by steam turbines, powered by a hybrid thermal system of either or both nuclear reactor/s and oil-fired boilers providing a total in excess of 120,000 shp; 2 propellers.
Sensors: 1 long-range air search radar; 1 height finder (3-D) radar; 1 each fire control radar for SS-N-19, SA-N-6 and SS-N-14 missiles; 2 fire control radars for SA-N-4 missiles; 1 fire control radar for 100 mm guns; 2 fire control radars for 30 mm guns; 1 hull-mounted sonar; 1 towed variable depth sonar.
Armament: 4 Kamov Ks-25 helicopters; 20 SS-N-19 anti-ship cruise missiles in individual launch silos; 12 SA-N-6 area air defence missile launchers; 2 twin SS-N-14 anti-submarine missile launchers; 2 single 100 mm dual-purpose guns; 8 single 30 mm Gatling-type anti-aircraft guns.
Top speed: Over 33 kt. **Range**: Unlimited.
Programme: *Kirov*, the lead ship of this as yet indeterminant sized class, commenced builder's trials in May 1980 and was handed over to the Soviet Navy for extended first-of-class trials in late 1980, at which time at least 1 sister ship was known to be under construction, estimated to be completed by early to

mid-1983. Current US Naval intelligence sources envisage the construction of another 2 of these ships, the last to be completed well before the close of the 1980s.

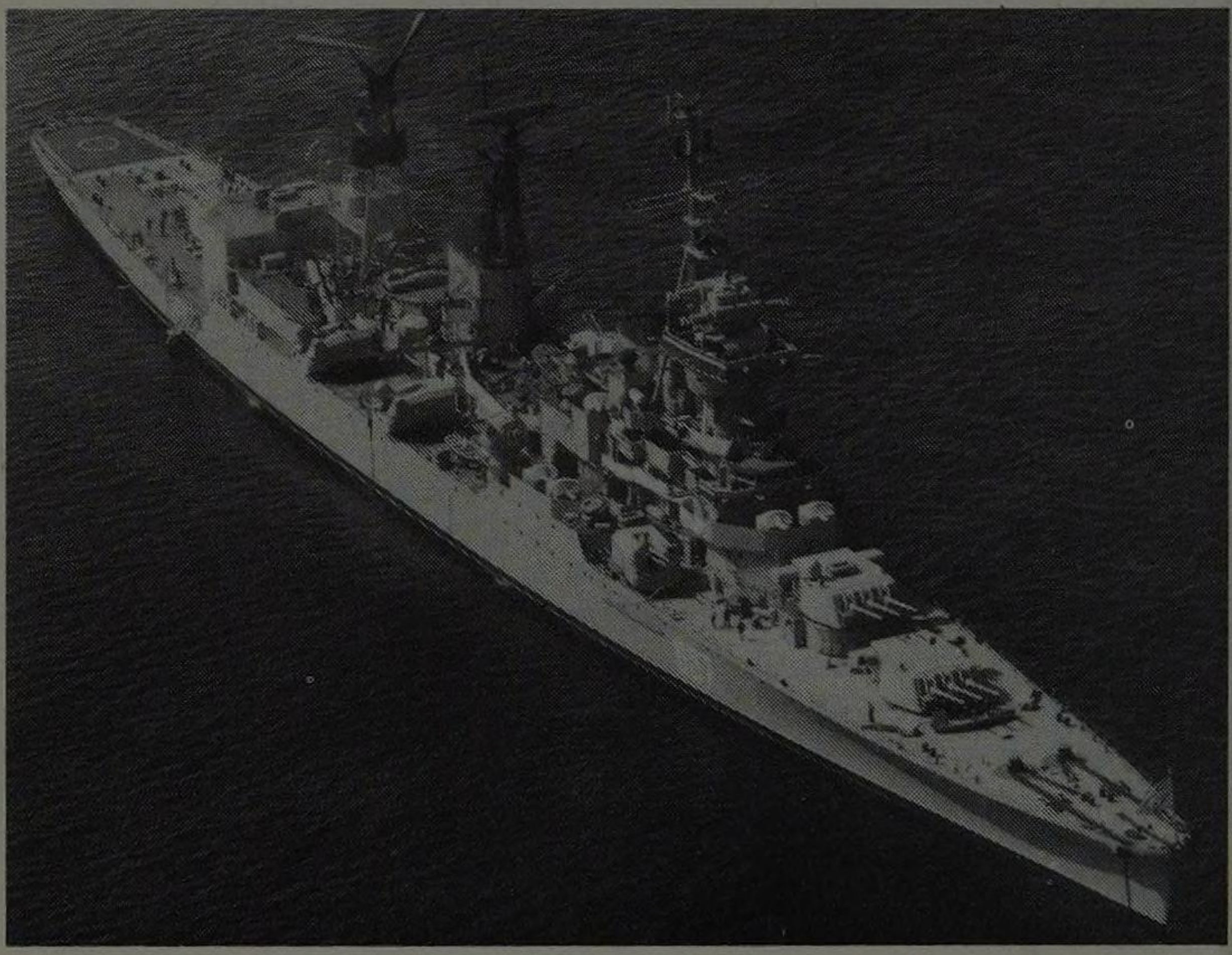
Notes: Certainly the largest and most powerful ship built to meet the conventional heavy cruiser role anywhere in the world since the end of World War II, the *Kirov*'s finely proportioned lines and weight indicate an extremely efficient hull design, married to a form of construction capable of withstanding far more combat damage than many of its Western World contemporaries. Turning to the operational requirement aspect, *Kirov*'s primary role appears precisely to parallel that of the US Navy's California/Virginia classes of cruiser, namely that of acting as the main defensive screen for a carrier-centred task force (and in this context, it may be pertinent to link *Kirov* with reports indicating construction of a Soviet nuclear-powered carrier, much bigger than the Kievs and capable of operating conventional carrier-going aircraft). *Kirov*'s sensor/weapons fit is extremely impressive, being both heavy and well balanced to meet the demands of the modern naval need to fight a potentially fully 3-dimensional threat. The anti-ship SS-N-19 has an effective range out to around 300 nautical miles, whilst the SA-N-6 area air defence missiles are reported to be effective out to a range of 40 nautical miles and up to an altitude of 100,000 feet when travelling at Mach 5.6, or nearly 4,000 mph whilst under power.



An oblique aeriel view of *Kirov* at speed.

Sverdlov class

Cruisers



Zhandov, one of two Modified Sverdlov command cruisers.

Role: General-purpose. **Builders**: Various, USSR.
User: Soviet Navy.
Basic data: 17,200 t full displacement; 689 ft (210 m) overall length; 70.85 ft (21.6 m) maximum beam. **Crew**: 1,010.
Propulsion: 2 geared steam turbines (total 100,000 shp); 2 propellers.
Sensors: 3 separate long-range air search radars; 1 nav radar; 16 fire control radars consisting of 4 differing types.
Armament: 4 triple 152 mm guns; 6 twin 100 mm dual-purpose guns; 16 twin 37 mm anti-aircraft (3 of this class also carry 8 twin 30 mm anti-aircraft guns in addition to 37 mm guns); mines.
Top speed: 32 kt. **Range**: 8,400 nautical miles at 15 kt.
Programme: An original 14 ship class built during the early 1950s, 9 standard and 3 modified ships still serve.
Notes: All retain at least 6 big guns for shore bombardment.

Moskva class

Cruisers

Soviet Navy's *Moskva* at anchor in the Mediterranean.

Role: Anti-submarine.
Builder: Nikolayev, USSR.
User: Soviet Navy.
Basic data: 17,000 t full displacement; 623 ft (190 m) overall length; 111.5 ft (34 m) maximum beam.
Crew: 850.
Propulsion: 2 geared steam turbines (total 100,000 shp); 2 propellers.
Sensors: 1 long-range air search radar; 1 height finder (3-D) radar; 3 nav radars; 2 fire control radars (missile); 2 fire control radars (57 mm guns); 1 hull-mounted sonar; 1 towed, variable depth sonar; IFF and other aircraft homing aids.
Armament: 18 Kamov Ka-25 helicopters; 2 twin SA-N-3 area air defence missile launchers; 1 twin SUW-N-1 short-range anti-submarine missile launcher; 2 twin 57 mm anti-aircraft guns; 2 RBU 6000 twelve-barrel 250 mm anti-submarine rocket launchers.
Top speed: 30 kt.
Range: 7,000 nautical miles at 15 kt.
Programme: This 2 ship class, the initial unit of which was laid down in 1962, comprises *Moskva* and *Leningrad*, which entered service with the Soviet fleet in 1967 and 1968, respectively.
Notes: Although not the first post-World War II hybrid ship (half cruiser, half helicopter carrier) to emerge (that honour must go to the French Navy's *Jeanne d'Arc*), the Moskva class display a typically aggressive Russian design approach to meeting a stated operational requirement. Both in terms of onboard weaponry and deployable airborne anti-submarine capability, these ships compare very favourably with the Italians' later *Vittorio Veneto* rival.

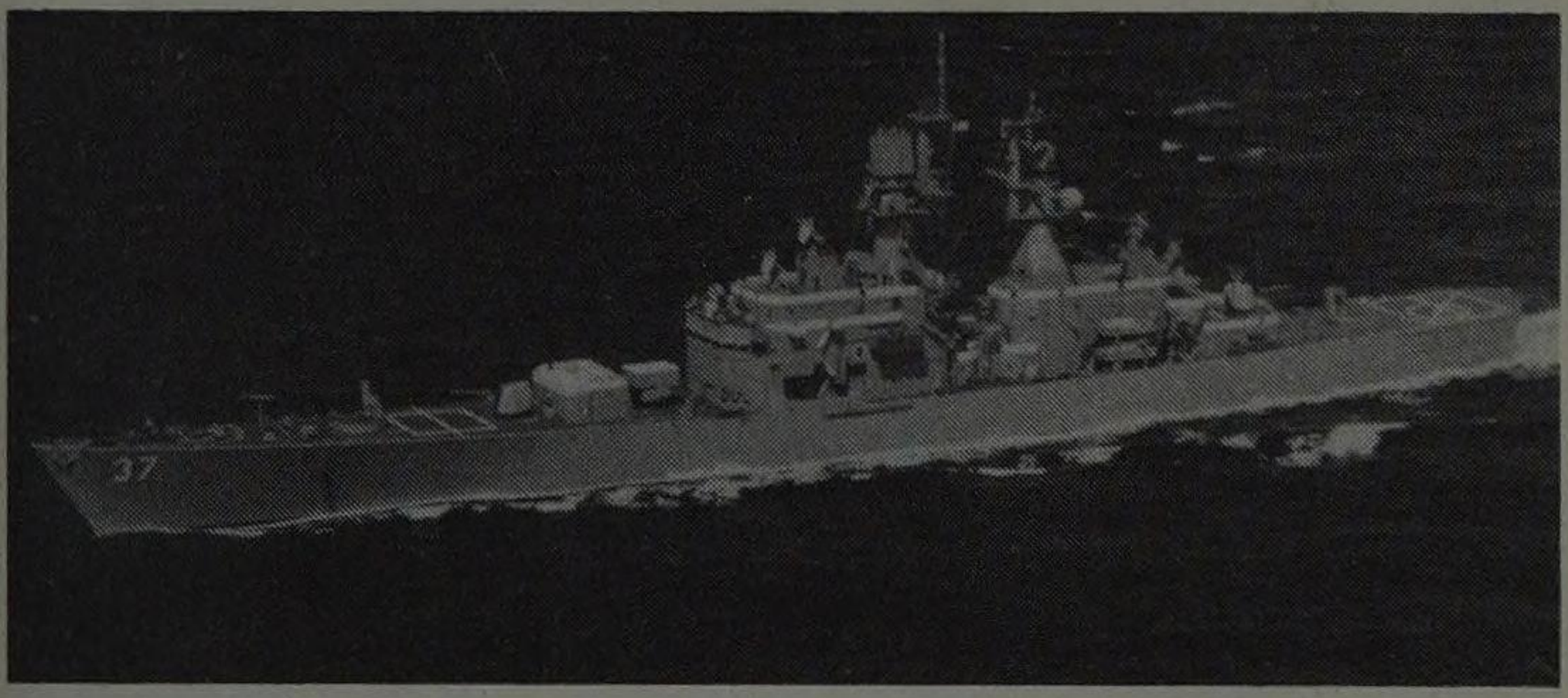
Colbert type

The cruiser *Colbert* (C611), 1976.

Role: Anti-aircraft.
Builder: DCAN Brest, France.
User: French Navy.
Basic data: 11,300 t full displacement; 590.5 ft (190 m) overall length; 66.25 ft (20.2 m) maximum beam. **Crew**: 562.
Propulsion: CEM Parsons geared steam turbines (total 86,000 shp); 2 propellers.
Sensors: 1 DRBV 51 and 1 DRBV 23C air search radars; 1 DRBI 10D height finder (3-D) radar; DRBV 50 surface search and nav radar; 2 DRBR 51 Masurca fire control radars; 2 DRBC 31 fire control radars (57 mm guns); 1 DRBC 32C 100 mm gun fire control radar; 1 TACAN aircraft homer; SENIT automated action information data processor.
Armament: 1 twin Masurca area air defence missile launcher (48 missiles); 2 single 100 mm dual-purpose guns; 6 twin 57 mm anti-aircraft guns.
Top speed: 32 kt. **Range**: 4,000 nautical miles at 25 kt.
Programme: Originally ordered in 1953, the sole *Colbert* (C611) was laid down in December 1953, launched in March 1956 and joined the fleet in May 1959. Underwent a major modernisation between 1970 and 1972, when it was converted to its current anti-air role.
Notes: The flagship of the French Navy, *Colbert* was always envisaged as primarily filling the anti-aircraft role, but initially mounted no less than sixteen 127 mm dual-purpose guns that have now been replaced by the 30 nautical mile ranged, near Mach 3 Masurca missiles and the 2 100 mm guns mounted forward.

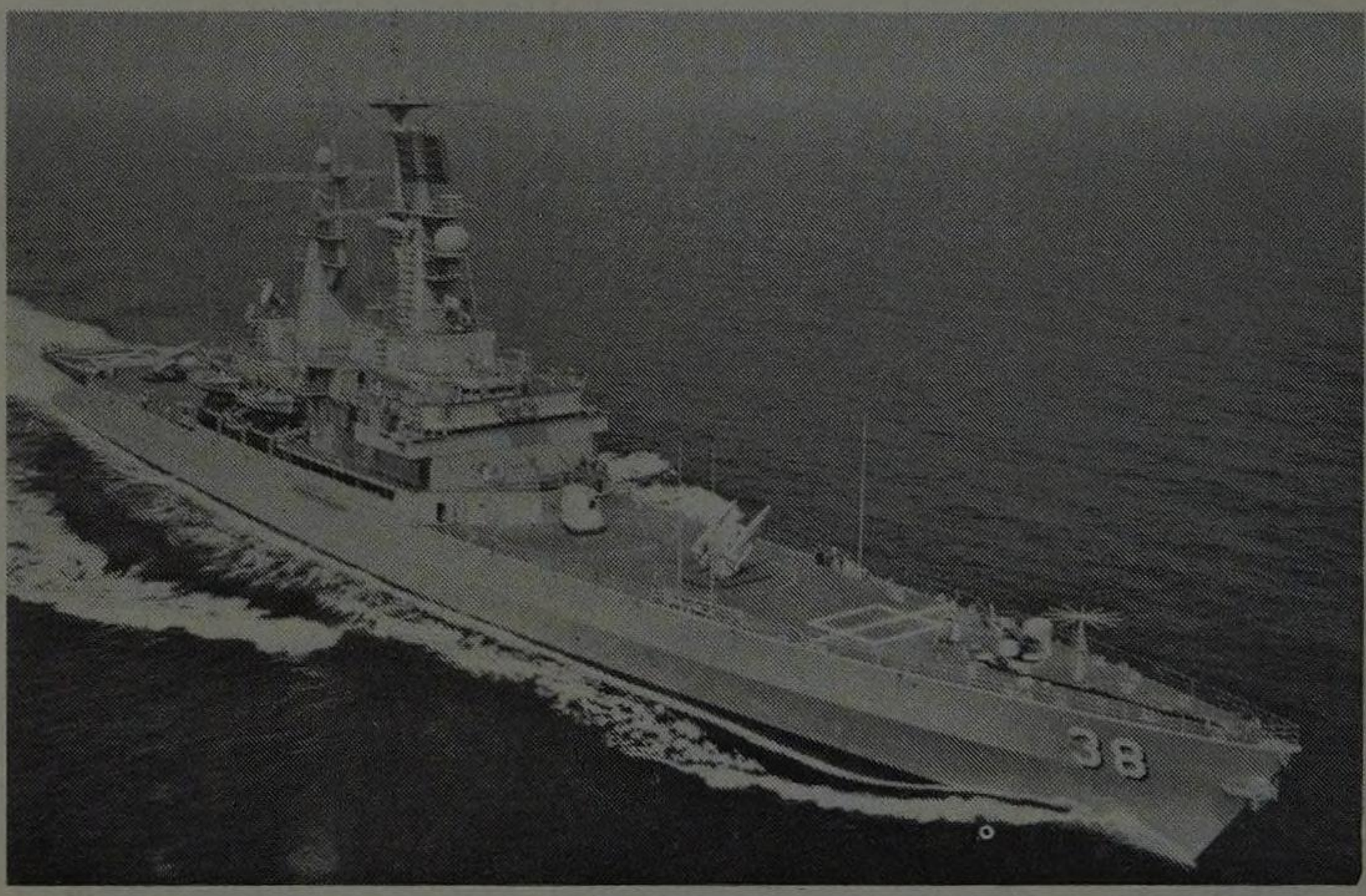
California class

Cruisers



USS *South Carolina* (CGN37) nuclear-powered cruiser.

Role: General-purpose.
Builder: Newport News, USA.
User: US Navy.
Basic data: 10,150 t full displacement; 596 ft (181.7 m) overall length; 61 ft (18.6 m) maximum beam. **Crew**: 533.
Propulsion: 2 General Electric D2G pressurised water nuclear reactors/geared steam turbines (total 60,000 shp); 2 propellers.
Sensors: 1 SPS-40B long-range air search radar; 1 SPS-48C height finder (3-D) radar; 1 SPS-55 surface search and nav radar; 1 SPG-51D and 1 SPG-60 missile fire control radars; 1 SPQ-9A surface target fire control radar; 1 SQS-26CX bow-mounted sonar; NTDS automated action information data processing system.
Armament: 2 single Mk 13 launchers for Tartar/Standard MR area air defence missiles; 1 octuple ASROC anti-submarine missile launcher; 2 single 5 inch Mk 45 dual-purpose guns; 2 Phalanx 20 mm close-in weapons systems; 4 lightweight anti-submarine torpedo tubes; Tomahawk cruise missiles and Harpoon anti-ship missiles are scheduled to be fitted to this class.
Top speed: 31 kt. **Range**: Unlimited.
Programme: Authorised under US fiscal year 1967 and 1968 budgets, this 2 ship class comprises USS *California* (CGN36) and USS *South Carolina* (CGN37). Both laid down during 1970, the ships entered service 11 months apart, in February 1974 and January 1975, respectively.
Notes: These ships, designed essentially as aircraft carrier escorts, were the first US nuclear-powered cruisers to be series built. Have helicopter pad but no hangar.



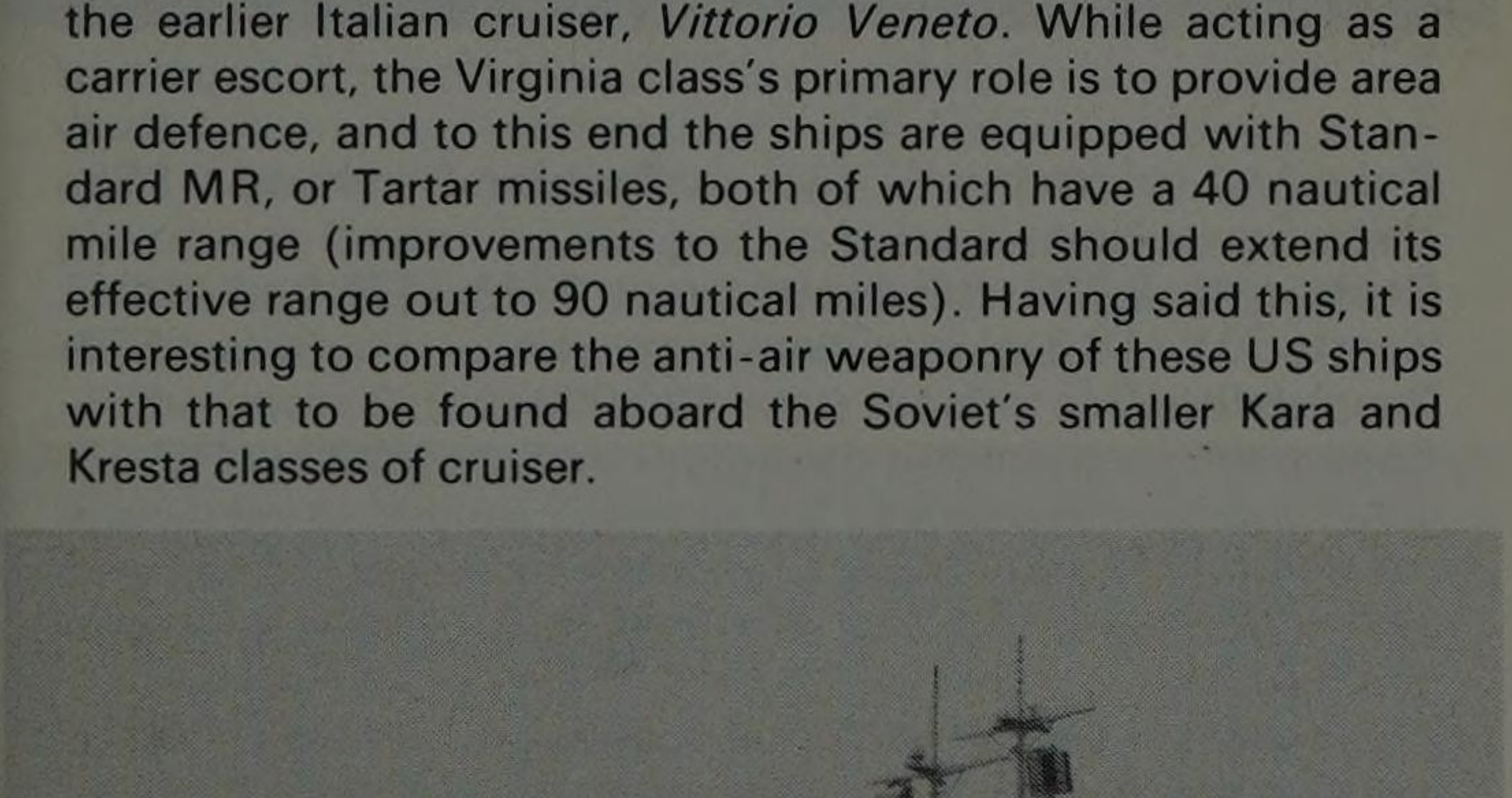
USS *Virginia* (CGN38) during sea trials in 1976.

Role: General-purpose. **Builder**: Newport News, USA.
User: US Navy.
Basic data: 11,000 t full displacement; 585 ft (178.3 m) overall length; 63 ft (19.2 m) maximum beam. **Crew**: 519.
Propulsion: 2 pressurised water D2G nuclear reactors/steam turbines (total 60,000 shp); 2 propellers.
Sensors: 1 SPS-40B long-range air search radar; 1 SPS-48C height finder (3-D) radar; 1 SPS-55 surface search radar; 2 SPG-51D and 1SPG-60 fire control radars (missiles); 1 SPQ-9A fire control radar (guns and ASROC); 1 SQS-53 bow-mounted sonar; NTDS automated action information data processing system.
Armament: 1 Kaman SH-2 Seasprite helicopter; 2 twin Mk 26 launchers for Tartar or Standard MR medium range air defence missiles (the forward Mk 26 launcher also handles ASROC anti-submarine missiles); 2 single 5 inch Mk 45 dual-purpose guns; 2 triple lightweight anti-submarine torpedo tubes. (Tomahawk cruise missiles and Harpoon anti-ship missiles are scheduled to be fitted to these cruisers during the early 1980s, as will be 2 Phalanx 20 mm close-in weapons systems.)
Top speed: 30 kt. **Range**: Unlimited.

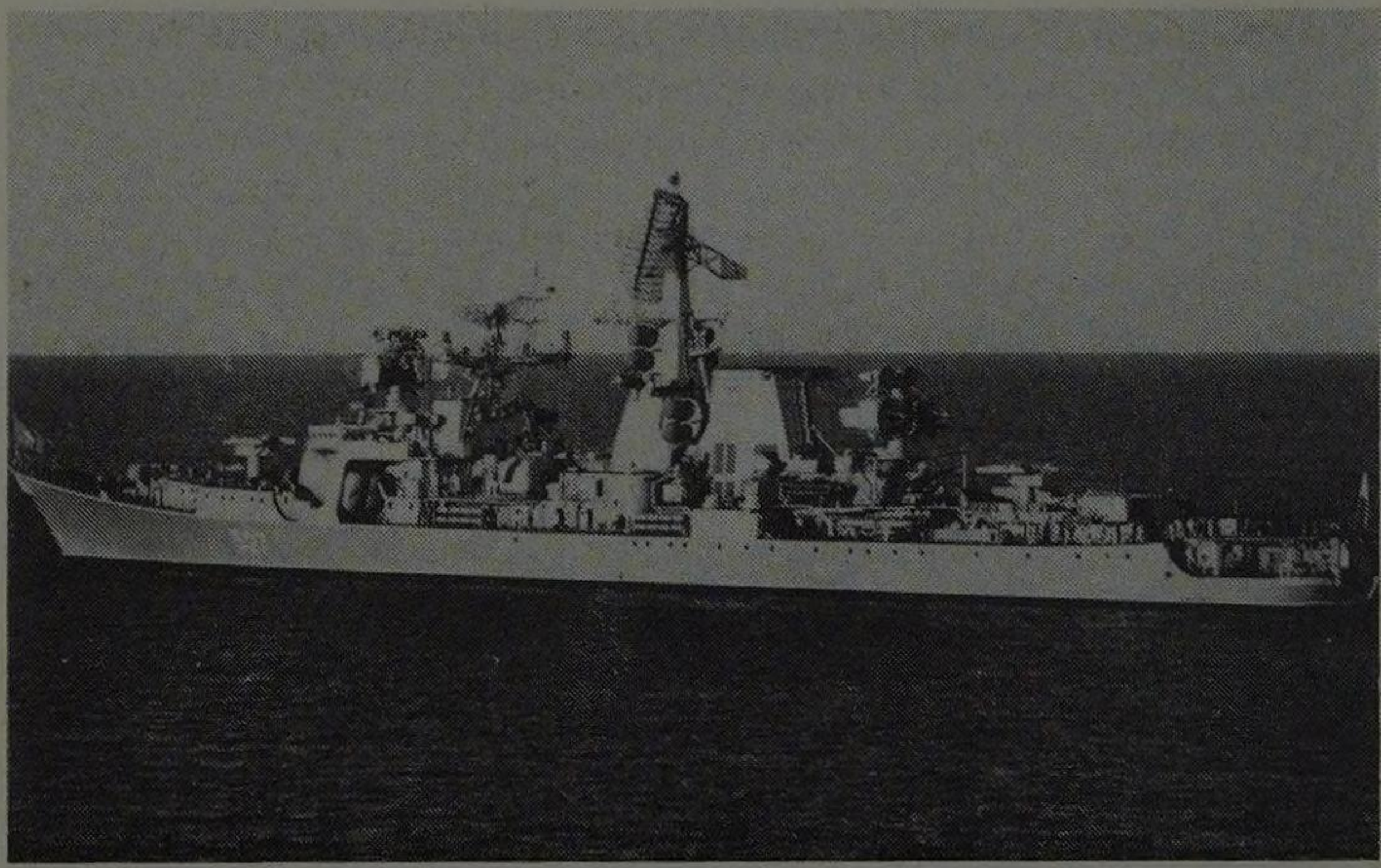
Cruisers

Programme: Like the preceding California class cruisers, the 4 ship Virginia class programme started life with much larger envisaged numbers than were actually achieved; the real constraint proving to be the eco-politically induced reduced fleet strength plans that emerged during the latter half of the 1970s. All 4 ships, USS *Virginia* (CGN38), USS *Texas* (CGN39), USS *Mississippi* (CGN40) and USS *Arkansas* (CGN41), were laid down between August 1972 and January 1977 and their respective commissioning dates were: September 1976, September 1977, August 1978 and October 1980.

Notes: Designed to act as large, high capability escorts for nuclear-powered carriers, the Virginia class ships are larger, improved versions of the California class nuclear-powered cruisers. Although not immediately apparent, one of the Virginia class's major advances is the incorporation of a helicopter hangar under the stern flight pad, similar to that employed in the earlier Italian cruiser, *Vittorio Veneto*. While acting as a carrier escort, the Virginia class's primary role is to provide area air defence, and to this end the ships are equipped with Standard MR, or Tartar missiles, both of which have a 40 nautical mile range (improvements to the Standard should extend its effective range out to 90 nautical miles). Having said this, it is interesting to compare the anti-air weaponry of these US ships with that to be found aboard the Soviet's smaller Kara and Kresta classes of cruiser.



A view from astern USS *Arkansas* (CGN41), 1980.



Ochakov, 1977.

Role: Anti-submarine. **Builder**: Nikolayev, USSR.
User: Soviet Navy.
Basic data: 9,700 t full displacement; 574 ft (175.0 m) overall length; 60 ft (18.3 m) maximum beam. **Crew**: 520.
Propulsion: Gas turbines (total 120,000 shp); 2 propellers.
Sensors: 1 long-range air search radar; 1 height finder (3-D) radar; 2 surface search and nav radars; 2 surface-to-air missile fire control radars; 2 each fire control radars for 76 mm and 30 mm gun systems; 1 hull-mounted sonar; 1 towed variable depth sonar.
Armament: 1 Kamov Ka-25 helicopter; 2 quadruple SS-N-14 anti-submarine missile launchers; 2 twin SA-N-3 surface-to-air missile launchers; 2 twin SA-N-4 surface-to-air missile launchers; 2 twin 76 mm dual-purpose guns; 4 single 30 mm Gatling anti-aircraft guns; 10 torpedo tubes.
Top speed: 32 kt. **Range**: 8,000 nautical miles at 15 kt.
Programme: The first of this 7 ship class was laid down during 1969 and joined the Soviet fleet in 1973. Delivery of this ship, *Nikolayev*, was followed by *Ochakov* (1974), *Kerch* (1975), *Azov* (1976), *Petropavlovsk* (1977), *Taskent* (1978) and *Tallin* (1979). The fourth ship, *Azov*, has undergone extensive modification to its aft sections, reportedly to act as trials ship for a

new, vertically-stowed surface-to-air missile system being developed for the new classes of Soviet cruisers and heavy destroyers now under construction.

Notes: The Kara class represents a larger and heavier follow-on to the Soviet first-generation Kresta II anti-submarine cruisers and carries the same primary armament of 8 SS-N-14 'Silex' 25 nautical mile ranged missiles. Where the Karas differ from their forebears is in the adoption of gas turbine propulsion (the first application to a Soviet cruiser) and the incorporation of a SA-N-4 short-range (out to around 8 nautical miles) surface-to-air missile system to back up the ships' primary defensive armament of out to 30 nautical mile SA-N-3 missiles. Any aircraft or missile penetrating these two outer defensive zones would still have to contend with the ships' not inconsiderable gun armament combination of out to around 5 nautical mile ranging 76 mm fire and the very high rate 30 mm Gatling gun close-in weapons systems, reported to be highly effective out to around 2 nautical miles. Although marginally lighter and smaller than the contemporary US Navy California class nuclear-powered cruisers, the Kara class's heavy armament provides an interesting comparison between the two generally similar sized ships, particularly in terms of the broader spectrum of weapons systems fitted to the Soviet cruisers.

A Kara class in the Mediterranean, February 1976.

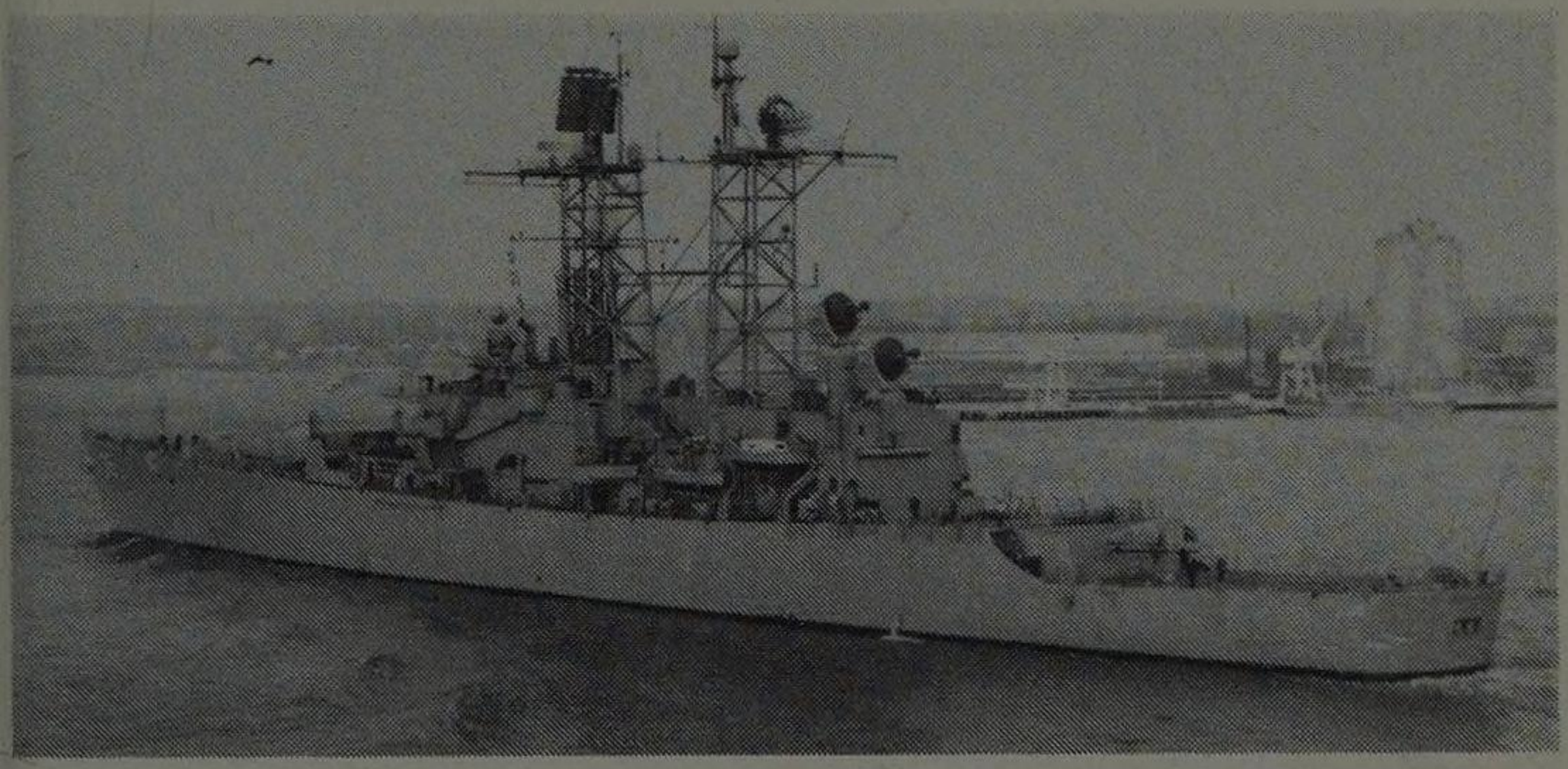
Vittorio Veneto type

Vittorio Veneto (C550) with 2 Bell 204s on flight pad aft.

Role: Anti-submarine. **Builder**: CNR Castellammare, Italy.
User: Italian Navy.
Basic data: 9,500 t full displacement; 589.2 ft (179.6 m) overall length; 63.6 ft (19.4 m) maximum beam. **Crew**: 565.
Propulsion: 2 Tosi geared steam turbines (total 73,000 shp); 2 propellers.
Sensors: 1 SPS-40 long-range air search radar; 1 SPS-52 height finder (3-D) radar; 1 SPQ-2B sea search radar; 1 SRM-7 nav radar; 2 SPG-55B fire control radars (missile); 4 Selenia RTN-10X fire control radars (guns); 1 URN-20A TACAN aircraft homer; 1 SQS-23 hull-mounted sonar.
Armament: Up to 9 Bell 204/212 sized, or 4 SH-3 Sea King sized helicopters; 1 twin Mk 20 Aster missile launcher for both Standard area air defence missiles or ASROC anti-submarine missiles; 8 single OTO-Melara 76 mm anti-aircraft guns; 2 triple lightweight anti-submarine torpedo tubes.
Top speed: 30.5 kt. **Range**: 6,000 nautical miles at 20 kt.
Programme: The sole type, *Vittorio Veneto* (C550), was laid down in June 1965, launched in February 1967 and entered into service in July 1969. It completed a major refit in 1982.
Notes: Flagship of the Italian Navy, the handsome lines of this powerfully armed cruiser are further enhanced by the expansive aft helicopter deck, with its below deck hangar (which cannot accept the larger-sized helicopters). Note the heavy secondary anti-aircraft gun armament flanking the ship.

Thruxton type

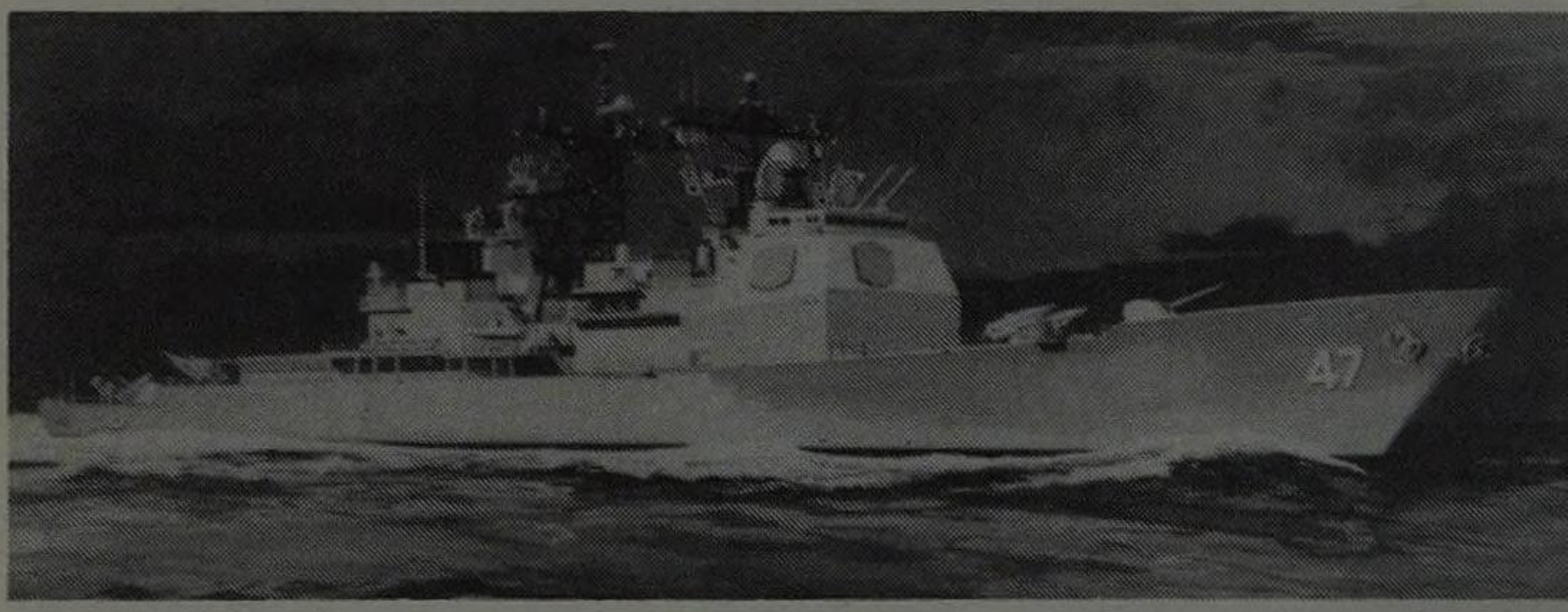
Cruisers



The nuclear-powered cruiser USS *Thruxton* (CGN35)

Role: General-purpose. **Builder**: NY Shipbuilding, USA.
User: US Navy.
Basic data: 9,200 t full displacement; 564 ft (171.91 m) overall length; 58 ft (17.67 m) maximum beam. **Crew**: 538.
Propulsion: 2 General Electric D2G nuclear reactors/2 geared steam turbines (total 60,000 shp); 2 propellers.
Sensors: 1 SPS-40 long-range air search radar; 1 SPS-48 height finder (3-D) radar; 1 SPS-10 surface search radar; 1 SPG-53 and 1 SPG-55 fire control radars; 1 SQS-26 bow-mounted sonar; NTDS automated action information data processing system.
Armament: 1 Kaman SH-2 Seasprite helicopter; 1 twin Mk 10 launcher for Terrier/Standard SM-1-ER area air defence missiles, or ASROC anti-submarine missiles; 2 quadruple Harpoon anti-ship missile launchers; 1 single 5 inch Mk 42 gun; 4 single, fixed lightweight anti-submarine torpedo tubes.
Top speed: 32 kt. **Range**: Unlimited.
Programme: Originally planned as the 10th of the oil-burning Belknap class cruisers, the US Congress directed that the ship be converted to nuclear propulsion. USS *Thruxton* (CGN35) commissioned in May 1967.
Notes: This modified Belknap design adopts a juxtaposed primary armament layout relative to its oil-burning sister ships. As built, USS *Thruxton* had 1 twin 3 inch anti-aircraft gun, but this has been replaced by Harpoon. Two Phalanx 20 mm close-in weapons systems are to be fitted.

Ticonderoga class

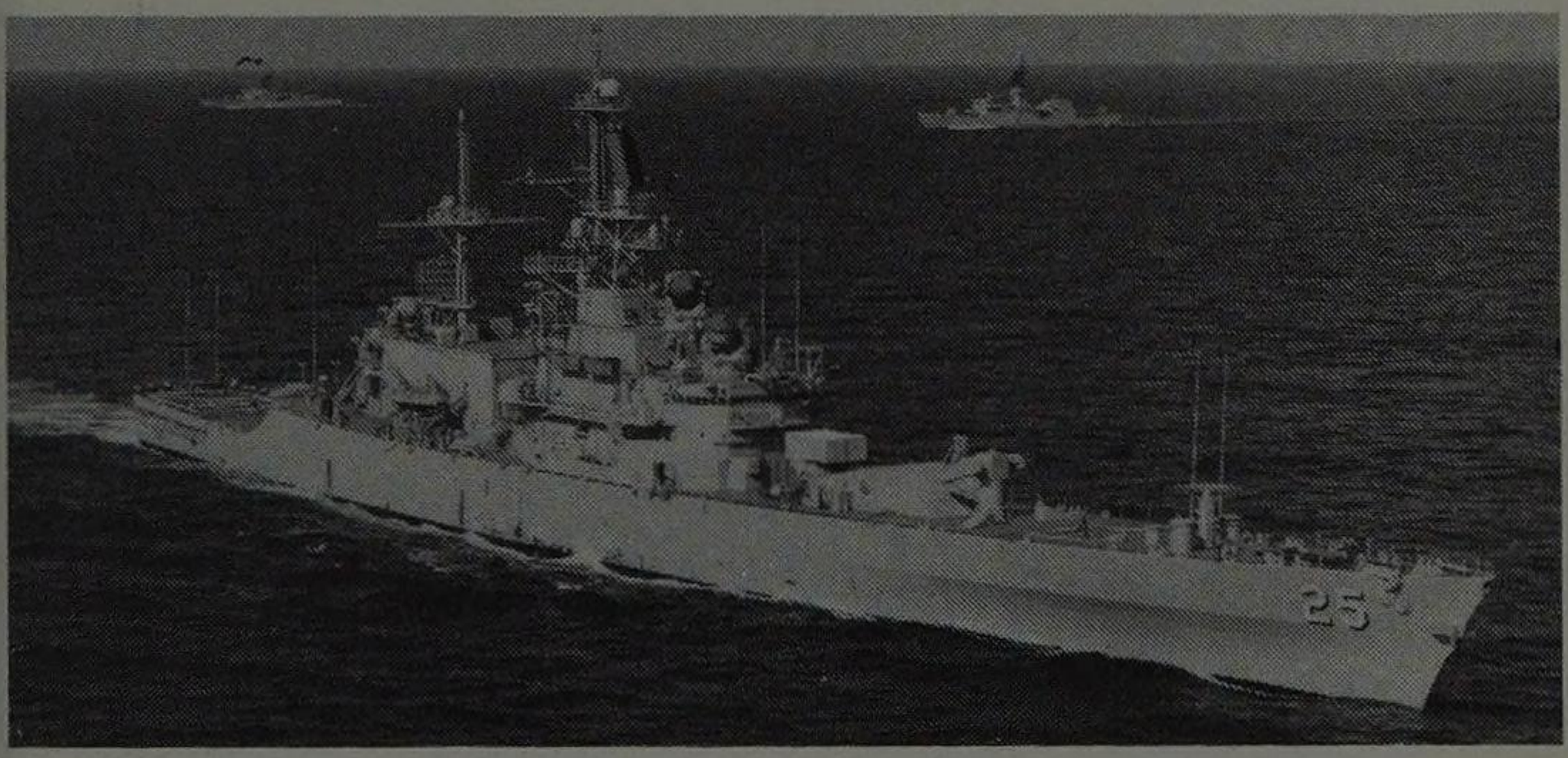


USS *Ticonderoga* (CG47) Aegis air defence cruiser.

Role: Area air defence. **Builder**: Ingalls Shipbuilding, USA.
User: US Navy.
Basic data: 9,100 t full displacement; 563.3 ft (171.7 m) overall length; 55 ft (16.8 m) maximum beam. **Crew**: 360.
Propulsion: 4 General Electric LM2500 gas turbines (total 80,000 shp); COGAG; 2 c-p propellers.
Sensors: 1 SPS-49 long-range air search radar; 1 SPS-55 surface search radar; 1 SPY-1A multi-function radar; 1 bow-mounted SQS-53A sonar; Mk 1 Command and Decision System action data processing.
Armament: 2 up to Sikorsky SH-60 Seahawk sized helicopters; 2 twin Mk 26 (early ships) or Ex Mk 41 launchers compatible with Standard MR area air defence missiles, Harpoon anti-ship missiles or ASROC anti-submarine missiles; 2 single 5 inch Mk 45 dual-purpose guns; 2 Phalanx 20 mm close-in weapons systems; 2 triple lightweight anti-submarine torpedo tubes.
Top speed: 32 kt. **Range**: 6,000 nautical miles at 20 kt.
Programme: Studied in conceptual form since the late 1960s under the Aegis seagoing fleet air defence requirements, early studies centred around a development of the Virginia class nuclear-powered cruisers, but these were ultimately dropped in favour of the CG47, or Ticonderoga class development of the existing Spruance class destroyers. The first of this possibly 18 ship class, USS *Ticonderoga* (CG47), laid down in January 1980, commissions in 1983.
Notes: Visually the raised bridge and the 'billboard'-like fixed SPY-1A arrays beneath serve to identify this class from the smaller Spruances.

Bainbridge type

Cruisers

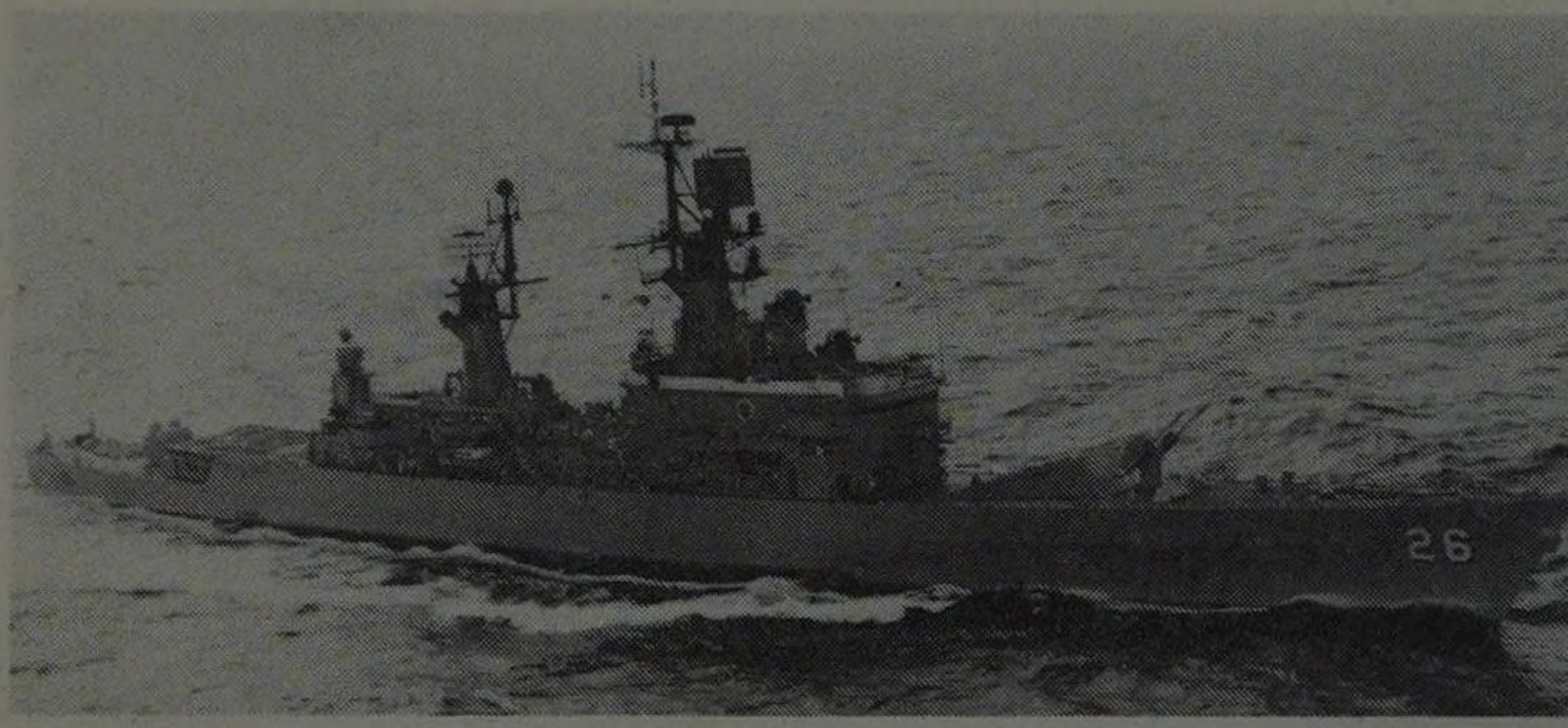


USS *Bainbridge* (CGN25) with the US Pacific Fleet, 1978.

Role: General-purpose. **Builder**: Bethlehem Steel, USA.
User: US Navy.
Basic data: 8,580 t full displacement; 565 ft (172.5 m) overall length; 58 ft (17.7 m) maximum beam. **Crew**: 499.
Propulsion: 2 pressurised water D2G nuclear reactors/steam turbines (total 60,000 shp); 2 propellers.
Sensors: 1 SPS-37 long-range air search radar; 1 SPS-39 height finder (3-D) radar; 1 SPS-10D surface search radar; 4 SPG-55B fire control radars (missiles); 1 Mk 111 fire control system (anti-submarine); 1 SQS-23 bow-mounted sonar.
Armament: 2 quadruple Harpoon anti-ship missile launchers; 2 twin Mk 10 Terrier/Standard ER area air defence missile launchers; 1 octuple cell Mk 16 ASROC anti-submarine missile launcher; 2 single 20 mm Mk 67 anti-aircraft guns being replaced by 2 Phalanx 20 mm close-in weapons systems; 2 triple lightweight anti-submarine torpedo tubes.
Top speed: 32 kt. **Range**: Unlimited.
Programme: Approved under US fiscal year 1956 authority, the USS *Bainbridge* (CGN25) was laid down in May 1959, launched in April 1961, and joined the US fleet in October 1962.
Notes: The sole of type, USS *Bainbridge* (CGN25) was the second US Navy nuclear-powered cruiser to be built, her hull and weapons layout closely resembling those of the near contemporary Leahy class conventionally-powered guided missile carrying cruisers.

Belknap class

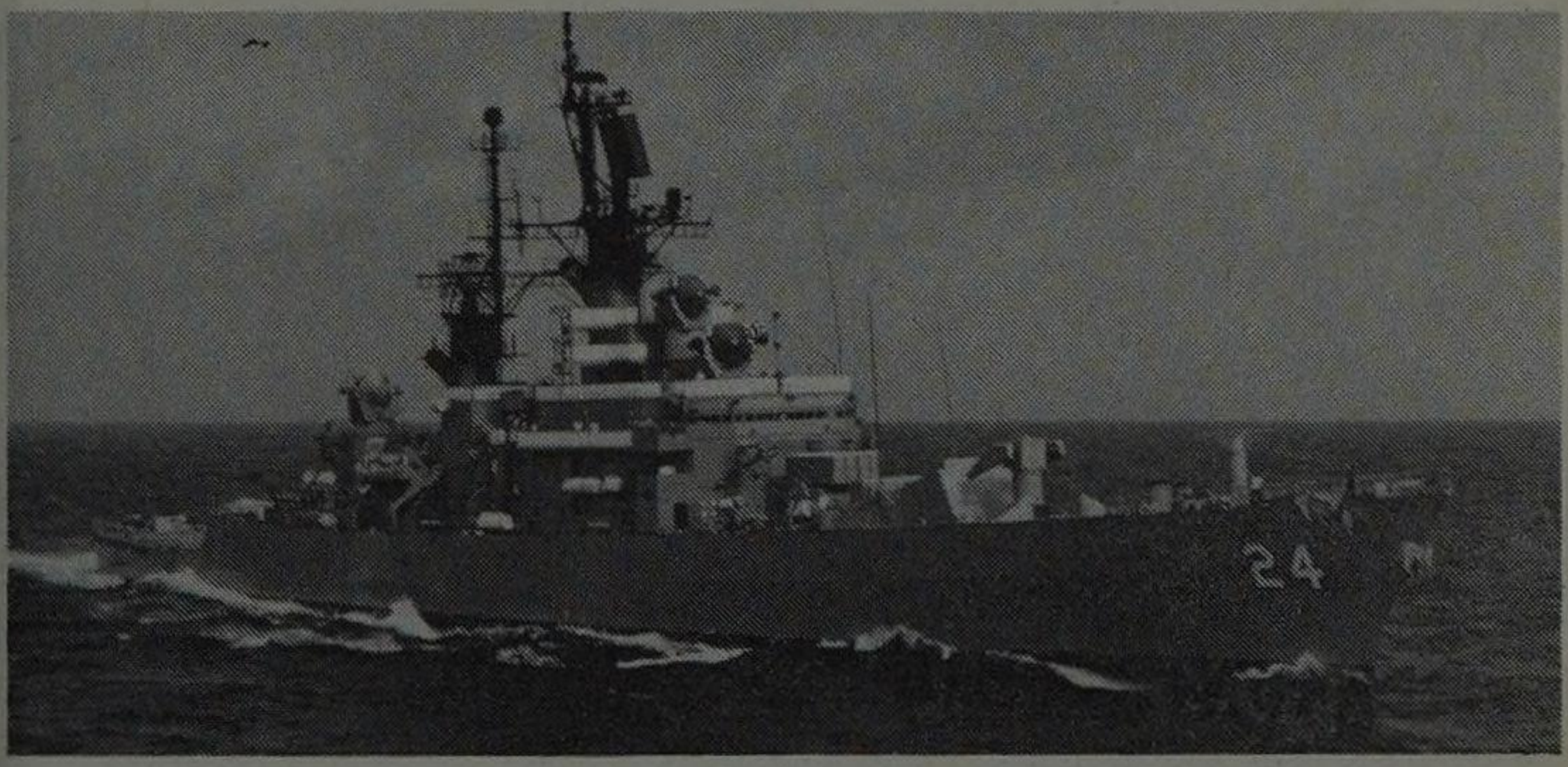
Cruisers



USS *Belknap* (CG26) with multi-type missile launchers forward.

Role: General-purpose.
Builders: Various, USA.
User: US Navy.
Basic data: 7,930 t full displacement; 547 ft (166.7 m) overall length; 54.75 ft (16.7 m) maximum beam.
Crew: 450.
Propulsion: 2 geared steam turbines (total 85,000 shp); 2 propellers.
Sensors: 1 SPS-49 long-range air search radar; 1 SPS-48 height finder (3-D) radar; 1 SPS-10F surface search radar; 1 LN66 nav radar; 1 SPG-53 (gun) and 1 SPG-55 (missile) fire control radar systems; 1 SQS-26BX hull-mounted (bow) sonar.
Armament: 1 Kaman SH-2 Seasprite helicopter; 2 quadruple Harpoon anti-ship missile launchers; 1 twin Mk 10 launcher for either Standard ER area air defence missiles or ASROC anti-submarine missiles; 1 single 5 inch Mk 42 dual-purpose gun; 1 Phalanx 20 mm air defence close-in weapons system; 6 torpedo tubes now removed.
Top speed: 33 kt.
Range: 7,100 nautical miles at 20 kt.
Programme: This 9 ship class comprises: USS *Belknap* (CG26), USS *Josephus Daniels* (CG27), USS *Wainwright* (CG28), USS *Jouett* (CG29), USS *Horne* (CG30), USS *Sterett* (CG31), USS *William P. Standley* (CG32), USS *Fox* (CG33) and USS *Biddle* (CG34). All vessels were laid down between February 1962 and December 1963, entering into service between November 1964 and January 1967.
Notes: Designed as primary carrier escorts, the Belknaps are a more potently armed development of the slightly smaller Leahy class.

Leahy class



USS *Reeves* (CG24) seen in the Indian Ocean, 1975.

Role: General-purpose. **Builders**: Various, USA.
User: US Navy.
Basic data: 7,800 t full displacement; 533 ft (162.5 m) overall length; 55 ft (16.8 m) maximum beam. **Crew**: 405.
Propulsion: 2 geared steam turbines (total 85,000 shp); 2 propellers.
Sensors: 1 SPS-49 long-range air search radar; 1 SPS-48 height finder (3-D) radar; 1 SPS-10 surface search and nav radar; 1 SPG-55B missile fire control radar; 1 SQS-23 bow-mounted sonar; NTDS automated action information data processing system.
Armament: 2 twin Mk 10 launchers for Terrier/Standard ER area air defence missiles; Harpoon anti-ship missiles being fitted in place of original 2 twin 3 inch guns amidships; 1 octuple ASROC anti-submarine missile launcher; 2 triple lightweight anti-submarine torpedo tubes. Helicopter pad only.
Top speed: 32 kt. **Range**: 8,000 nautical miles at 14 kt.
Programme: This 9 ship class comprises: USS *Leahy* (CG16), USS *Harry E. Yarnell* (CG17), USS *Worden* (CG18), USS *Dale* (CG19), USS *Richmond K. Turner* (CG20), USS *Gridley* (CG21), USS *England* (CG22), USS *Halsey* (CG23) and USS *Reeves* (CG24). All were commissioned between August 1962 and June 1964. Last major refit commenced during 1976.
Notes: The smallest of the US cruiser classes, the Leahys, as with other US warships, are being equipped with 2 Phalanx 20 mm close-in weapons systems to help fend off air attack.

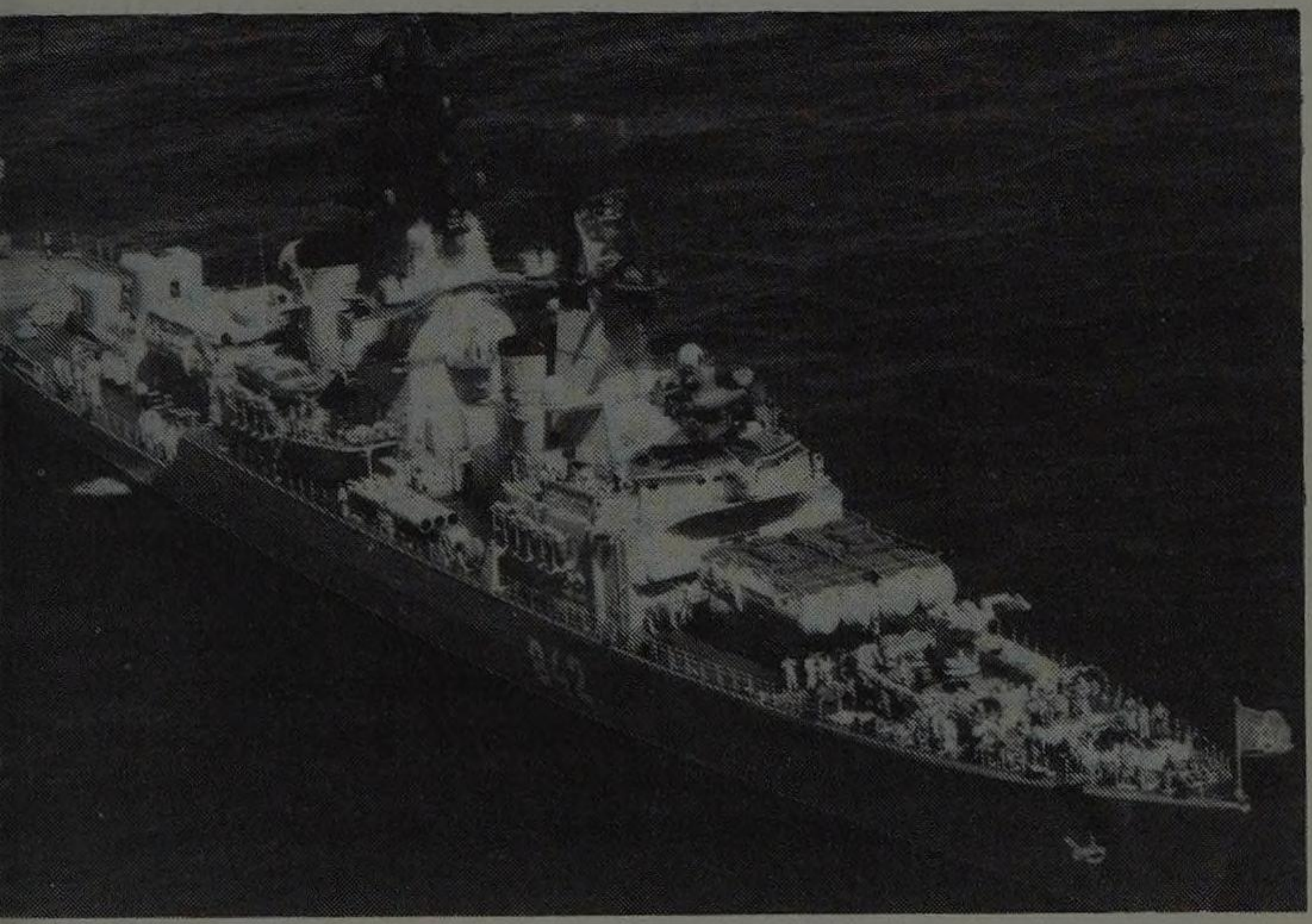
Kresta II class

Kresta II with Ka-25 helicopter aft, April 1975.

Role: Anti-submarine. **Builder**: Zhdanov, USSR.
User: Soviet Navy.
Basic data: 7,600 t full displacement; 524 ft (160 m) overall length; 55.75 ft (17 m) maximum beam. **Crew**: 380.
Propulsion: Steam turbines (total 100,000 shp); 2 propellers.
Sensors: 1 long-range air search radar; 1 height finder radar; 2 surface search/nav radars; 4 fire control radars (2 each for missile and gun systems); 1 hull-mounted sonar.
Armament: 1 Kamov Ka-25 helicopter; 2 quadruple SS-N-14 anti-submarine missile launchers; 2 twin SA-N-3 surface-to-air missile launchers; 2 twin 57 mm and 4 Gatling 30 mm anti-aircraft guns; 2 multi-barrel anti-submarine rocket launchers; 10 torpedo tubes.
Top speed: 35 kt. **Range**: 7,000 nautical miles at 14 kt.
Programme: All 10 ships of this class were delivered between 1970 and 1978, comprising: *Kronshtadt* (1970), *Admiral Isakov* (1971), *Admiral Nakimov* (1972), *Admiral Marakov* (1973), *Marshal Voroshilov* (1973), *Admiral Oktyabr'skiy* (1974), *Admiral Isachenkov* (1975), *Marshal Timosenko* (1976), *Vasiliy Chapaev* (1977) and *Admiral Yumashev* (1978).
Notes: Marginally longer and heavier than the Kresta Is, these ships are the first of the recent Soviet cruisers to be primarily armed for anti-submarine duties. Note the heavy SA-N-3 area air defence capability effective out to 30 nautical miles.

Kynda class

Cruisers



A Kynda class cruiser. Note helicopter pad at stern.

Role: Anti-ship. **Builder**: Zhdanov, USSR.
User: Soviet Navy.
Basic data: 5,600 t full displacement; 459 ft (140 m) overall length; 51.8 ft (15.8 m) maximum beam. **Crew**: 375.
Propulsion: 2 geared steam turbines (total 100,000 shp); 2 propellers.
Sensors: 2 long-range air search radars; 2 nav radars; 2 tracking radars (SS-N-3); 1 tracking radar (both missile systems); 2 tracking radars (SA-N-1); 1 hull-mounted sonar.
Armament: 2 quadruple SS-N-3 'Shaddrock' anti-ship cruise missile launchers; 1 twin SA-N-1 'Goa' medium-range anti-aircraft missile launcher; 2 twin 76 mm dual-purpose guns; 2 triple heavyweight anti-submarine torpedo tubes; 2 twelve barrel anti-submarine rocket launchers. Helicopter pad aft only.
Top speed: 34 kt. **Range**: 6,800 nautical miles at 15 kt.
Programme: A 4 ship class, the first two, *Groznyy* and *Admiral Fukin*, entered service in 1962, followed by *Admiral Golovko* and *Varyag* in 1965.
Notes: The first of the modern breed of Soviet guided missile carrying cruisers.

Spruance class

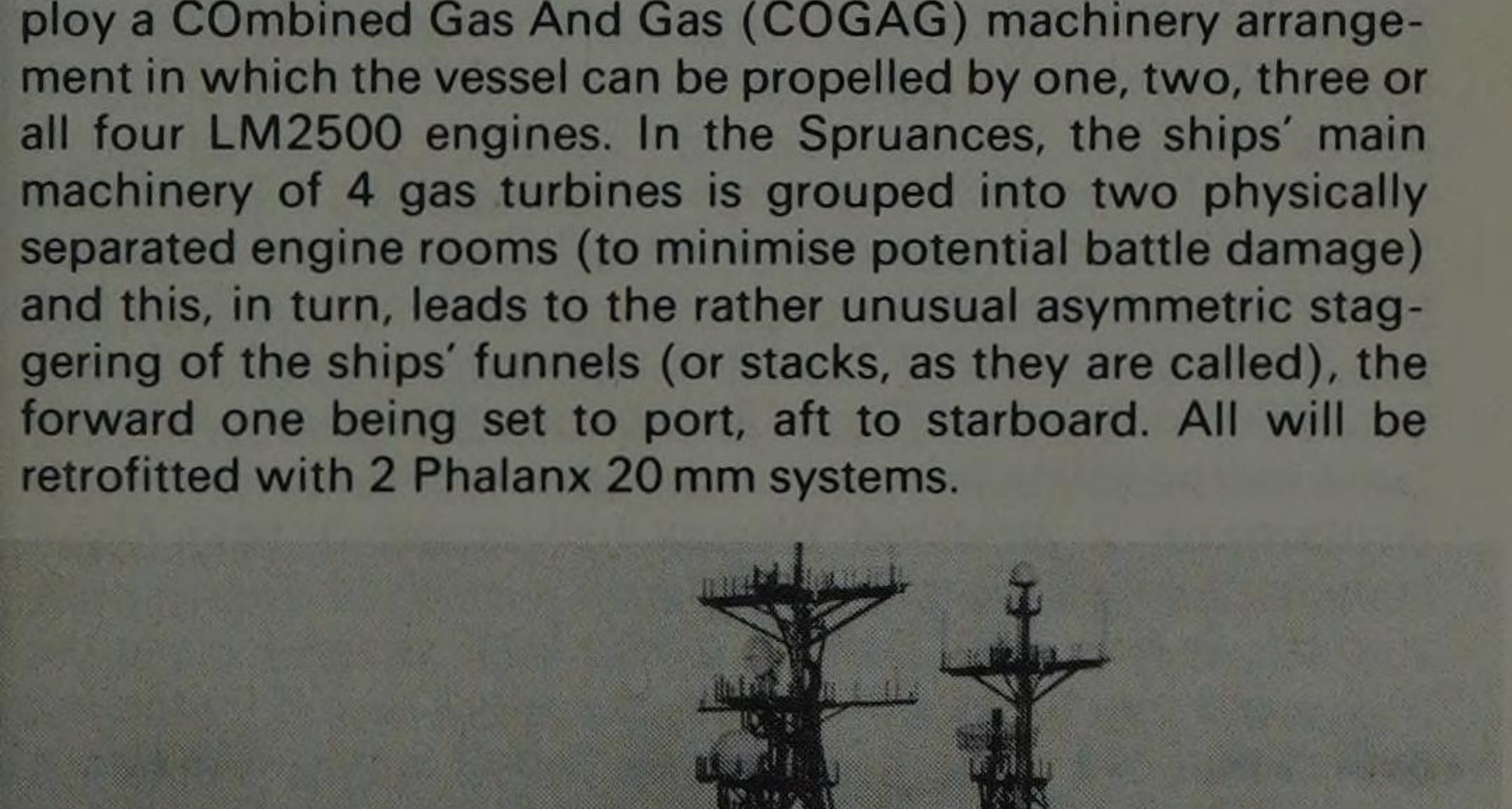
Destroyers

USS *Elliott* (DD967) at speed, May 1978.

Role: Anti-submarine. **Builder**: Ingalls Shipbuilding, USA.
User: US Navy.
Basic data: 7,800 t full displacement; 563.3 ft (171.7 m) overall length; 55 ft (16.8 m) maximum beam. **Crew**: 302.
Propulsion: 4 General Electric LM2500 gas turbines (total 80,000 shp); COGAG; 2 c-p propellers.
Sensors: 1 SPS-40B air search radar; 1 SPS-55 surface search radar; 1 SPG-60 STIR missile fire control radar; 1 SPQ-9A surface target fire control radar; 1 SQS-53 bow-mounted sonar; NTDS automated action information data processing system.
Armament: 1 Sikorsky SH-3 Sea King or 2 Sikorsky SH-60 Seahawk helicopters; 1 octuple Mk 29 launcher for Sea Sparrow point air defence missiles; 2 quadruple Harpoon anti-ship missile launchers; 1 octuple Mk 16 launcher for ASROC anti-submarine missiles.
Top speed: 32 kt. **Range**: 6,000 nautical miles at 20 kt.
Programme: The 31 ship Spruance class destroyers were the subject of a sole source contract placed with the Ingalls Shipbuilding Division of Litton Industries in June 1970 (for 30 ships, 1 being added in September 1979). The class comprises: USS *Spruance* (DD963), USS *Paul F. Foster* (DD964), USS *Kinkaid* (DD965), USS *Hewitt* (DD966), USS *Elliott* (DD967), USS *Arthur W. Radford* (DD968), USS *Peterson* (DD969), USS *Caron* (DD970), USS *David R. Ray* (DD971), USS *Oldendorf* (DD972), USS *John Young* (DD973), USS *Comte De Grasse* (DD974), USS *O'Brien* (DD975), USS *Merrill* (DD976), USS *Briscoe* (DD977), USS *Stump* (DD978), USS *Conolly* (DD979), USS *Moosbrugger* (DD980), USS *John Hancock* (DD981), USS *Nicholson* (DD982), USS *John*

Rodgers (DD983), USS *Leftwich* (DD984), USS *Cushing* (DD985), USS *Harry W. Hill* (DD986), USS *O'Bannon* (DD987), USS *Thorn* (DD988), USS *Deyo* (DD989), USS *Ingersoll* (DD990), USS *Fife* (DD991), USS *Fletcher* (DD992) and USS *Hayler* (DD997). With the exception of the lately ordered 31st ship, all Spruances were laid down between November 1972 and April 1978 and all 30 were commissioned between September 1975 and July 1980; with the 31st Spruance to be commissioned in 1983. (The 4 ships, DD993 through DD996, were anti-air versions of the Spruance ordered by Iran, but subsequently brought into US Navy service as the **Kidd class**.)

Notes: Large and very angular of line, the Spruance class ships were built as replacements for the World War II destroyers of the Allen M. Sumner and Gearing classes. Designed using modular construction techniques, the Spruance class ships employ a COmbined Gas And Gas (COGAG) machinery arrangement in which the vessel can be propelled by one, two, three or all four LM2500 engines. In the Spruances, the ships' main machinery of 4 gas turbines is grouped into two physically separated engine rooms (to minimise potential battle damage) and this, in turn, leads to the rather unusual asymmetric staggering of the ships' funnels (or stacks, as they are called), the forward one being set to port, aft to starboard. All will be retrofitted with 2 Phalanx 20 mm systems.



A frontal aspect of USS *O'Brien* (DD975).

County class

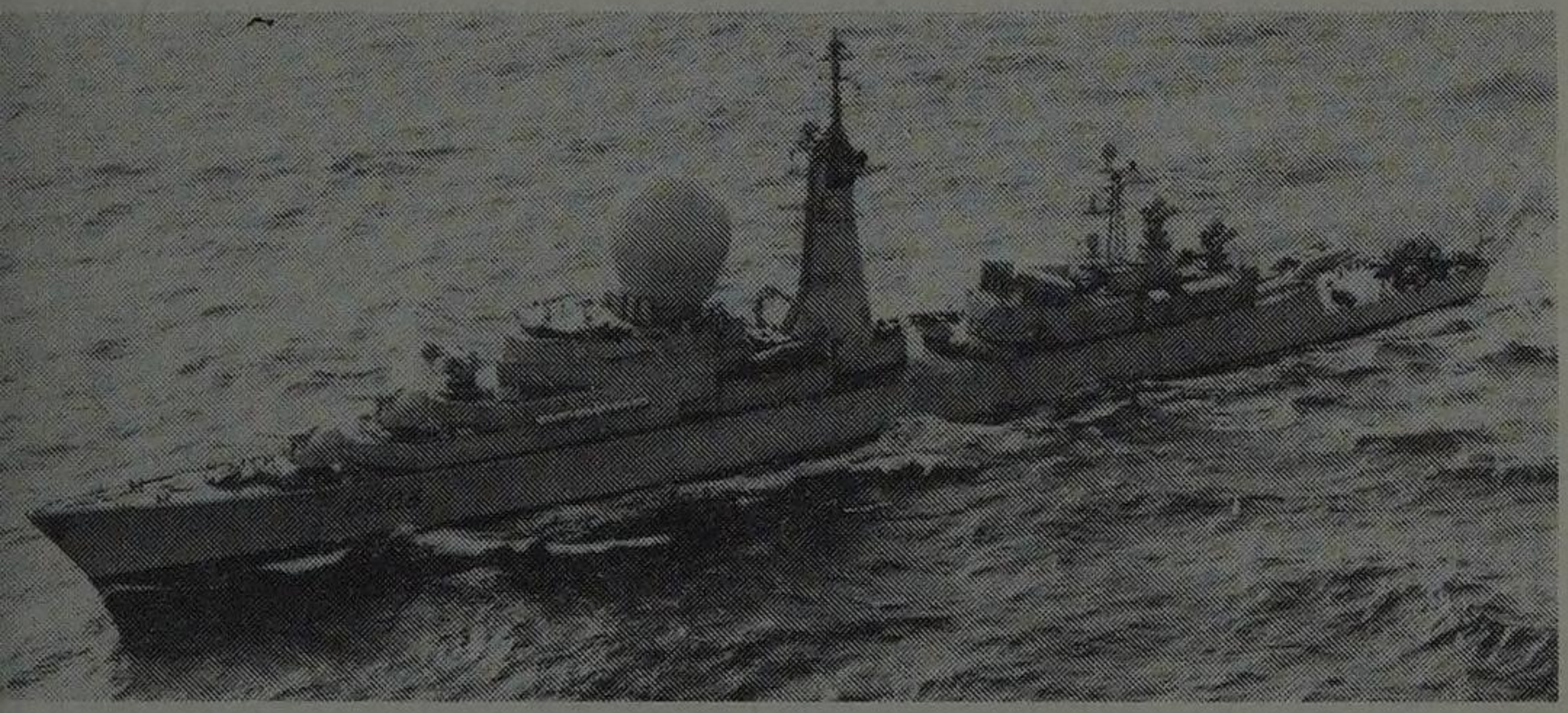
Destroyers

HMS *Norfolk* prior to becoming the *Capitan Prat*.

Role: Anti-aircraft. **Builders**: Various, UK.
Users: Royal Navy, Chilean Navy, Pakistan Navy.
Basic data: 6,200 t full displacement; 520 ft (158.5 m) overall length; 54 ft (16.5 m) maximum beam. **Crew**: 486.
Propulsion: 2 AEI geared steam turbines (total 30,000 shp) plus 4 Metrovick G.6 gas turbines (total 30,000 shp); COSAG; 2 propellers.
Sensors: 1 Type 965 long-range air search radar; 1 Type 992Q low-level air and surface search radar; 1 Type 278 height finder (3-D) radar; 1 Type 901 Seaslug fire control radar; 1 Type 903 gun fire control radar; 2 Type 904 Seacat fire control radars; 1 Type 1006 nav radar; 1 Type 184 hull-mounted sonar; ADAWS 1 automated action information data processing system.
Armament: 2 Westland Wessex helicopters; 1 twin Mk II launcher for Seaslug area air defence missiles; 4 Exocet anti-ship missiles on D18, D19, D20 amd D21, which replace the 'B', or 2nd gun turret, other ships carrying 2 twin 4.5 inch Mk 6 dual-purpose guns; 2 quadruple Seacat point air defence missile launchers.
Top speed: 30 kt. **Range**: 3,500 nautical miles at 28 kt.
Programme: Originally an 8 ship class built between March 1959 and October 1970, HMS *Antrim* (D18), HMS *Glamorgan* (D19) and HMS *Fife* (D20) remained in service with the Royal Navy, while the former HMS *Norfolk* (D21) has been sold to the Chilean Navy where it serves as the *Capitan Prat*. Another ship, the former HMS *London* (D16), has been sold to Pakistan, where it will serve as the *Badur*.
Notes: Sturdy ships, HMS *Glamorgan* survived an Exocet strike on 11 June 1982, while operating with the Falklands task force.

Suffren class

Destroyers



Duquesne (D603) Suffren class destroyer, 1977.

Role: General purpose. **Builders:** DCAN (various), France.
User: French Navy.
Basic data: 6,090 t full displacement; 517 ft (157.6m) overall length; 50.85 ft (15.5 m) maximum beam. **Crew:** 355.
Propulsion: 2 Rateau geared steam turbines (total 72,500 shp); 2 propellers.
Sensors: 1 DRBI 23 air search (3-D) radar; 1 DRBV 50 surface search radar; 1 Decca/DRBN 32 nav radar; 2 DRBR 51 fire control radars (Masurca); 1 DRBC 32A fire control radar (100 mm guns); 1 DUBV 23 hull-mounted sonar; 1 DUBV 43 towed variable depth sonar; SENIT automated action information data processor.
Armament: 4 Exocet anti-ship missile launchers; 1 twin Masurca area air defence missile launcher (reloadable); 1 Malafon anti-submarine missile launcher (13 missiles); 2 100 mm Model 1968 dual-purpose guns; 4 single 20 mm Oerlikon anti-aircraft guns; 2 heavyweight anti-submarine torpedo catapults (10 torpedoes).
Top speed: 34 kt. **Range:** 5,100 nautical miles at 18 kt.
Programme: A 2 ship class, the first, *Suffren* (D602), was laid down in December 1962, launched in May 1965 and accepted in July 1967. *Duquesne* (D603) was laid down in November 1964, launched in February 1966 and accepted in April 1970.
Notes: One of the first generation guided missile destroyers, the two Suffren class ships were the first post-World War II French warships to be designed from the start as general-purpose vessels.

Coontz class

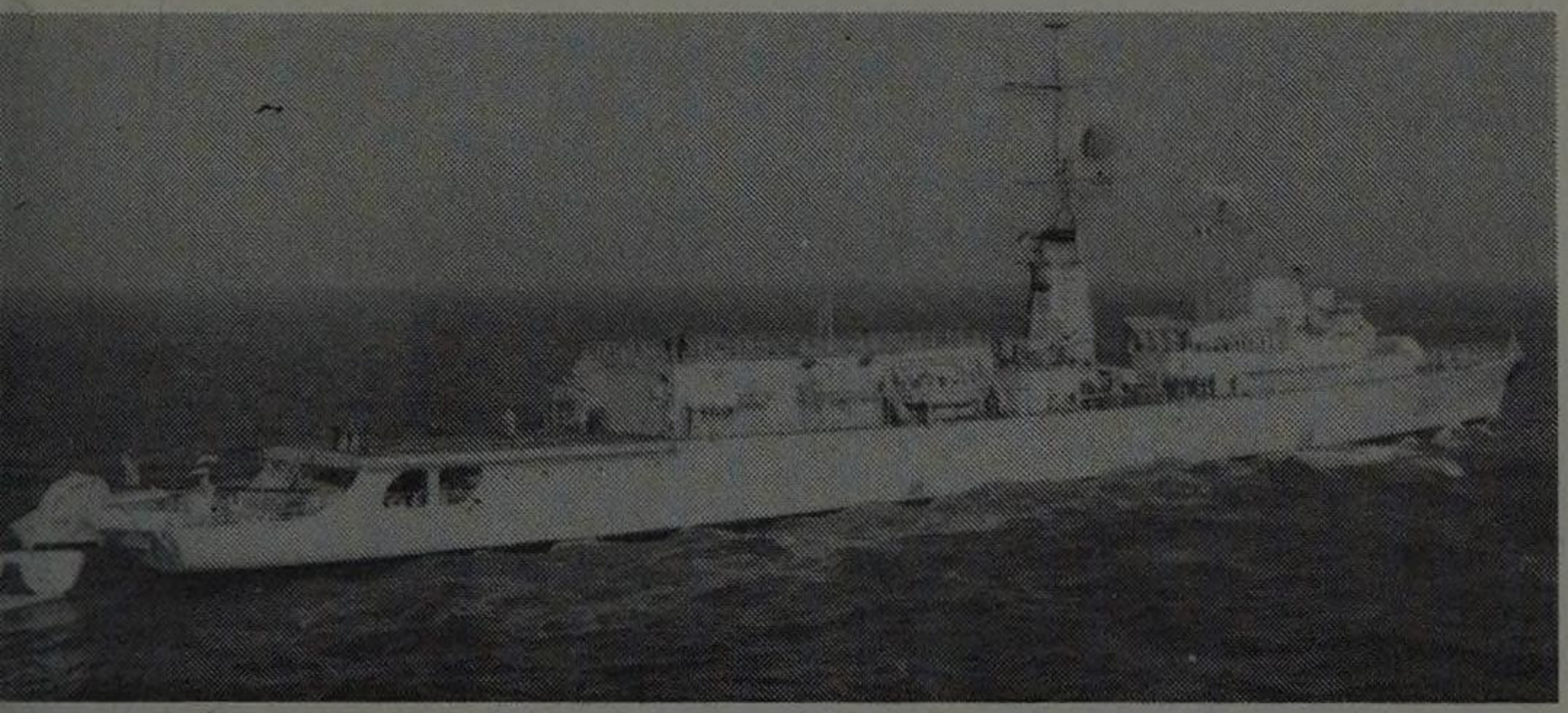
Destroyers

USS *King* (DDG41) carrying pre-1976 identity.

Role: Anti-aircraft. **Builders**: Various, USA.
User: US Navy.
Basic data: 5,800 t full displacement; 512.5 ft (152.6 m) overall length; 52.5 ft (15.9 m) maximum beam. **Crew**: 398.
Propulsion: 2 geared steam turbines (total 85,000 shp); 2 propellers.
Sensors: 1 SPS-29 or 1 SPS-37 air search radar; 1 SPS-48 height finder (3-D) radar; 1 SPS-10B surface search radar; 1 SPG-53A gun fire control radar; 2 SPG-55B missile fire control radar; 1 SQS-23 hull-mounted sonar; NTDS automated action information data processing system.
Armament: 1 twin Mk 10 launcher for Terrier/Standard ER area air defence missiles; 2 quadruple Harpoon anti-ship missile launchers; 1 single 5 inch Mk 42 dual-purpose gun; 1 octuple Mk 16 launcher for ASROC anti-submarine missiles; 2 triple lightweight anti-submarine torpedo tubes; 2 Phalanx 20 mm close-in weapons systems in process of being fitted.
Top speed: 33 kt. **Range**: 6,000 nautical miles at 14 kt.
Programme: This 10 ship class comprises: USS *Farragut* (DDG37), USS *Luce* (DDG38), USS *MacDonough* (DDG39), USS *Coontz* (DDG40), USS *King* (DDG41), USS *Mahan* (DDG42), USS *Dahlgren* (DDG43), USS *Wm V. Pratt* (DDG44), USS *Dewey* (DDG45) and USS *Preble* (DDG46); all commissioned between late 1959 and late 1961.
Notes: These ships have a helicopter pad aft, but no facilities.

Tourville class

Destroyers



The French Navy's *Tourville* (D610) at speed.

Role: Anti-submarine.

Builder: DCAN Loient, France.

User: French Navy.

Basic data: 5,700 t full displacement; 500.3 ft (152.5 m) overall length; 50.2 ft (15.3 m) maximum beam. **Crew**: 282.

Propulsion: 2 Ratean geared steam turbines (total 57,300 shp); 2 propellers.

Sensors: 1 DRBV 26 long-range air search radar; 1 DRBV 51B low-level air and surface search radar; 1 DRBC 32D gun fire control radar; 2 Decca 1226 nav radars; 1 DUBV 23 bow-mounted sonar, used in conjunction with 1 DUBV 43 towed, variable depth sonar; SENIT 3 automated action information data processing system.

Armament: 2 Westland Lynx helicopters; 6 Exocet anti-ship missile launchers; 2 single 100 mm Model 1968 dual-purpose guns; 1 Crotale point air defence missile launcher system; 2 single 20 mm Oerlikon anti-aircraft guns; 1 single Malafon anti-submarine missile launcher; 2 heavyweight anti-submarine torpedo catapults.

Top speed: 31 kt. **Range**: In excess of 6,000 nautical miles.

Programme: This 3 ship class comprises *Tourville* (D610), *Duguay Trouin* (D611) and *De Grasse* (D612). Laid down between 1970 and 1972, the ships entered service in June 1974, September 1975 and October 1977, respectively. The rapid-response Crotale was recently installed in place of the aft (third) 100 mm gun shown in the photograph.

Notes: This class is a more compact, well armed development of the earlier Suffren class.

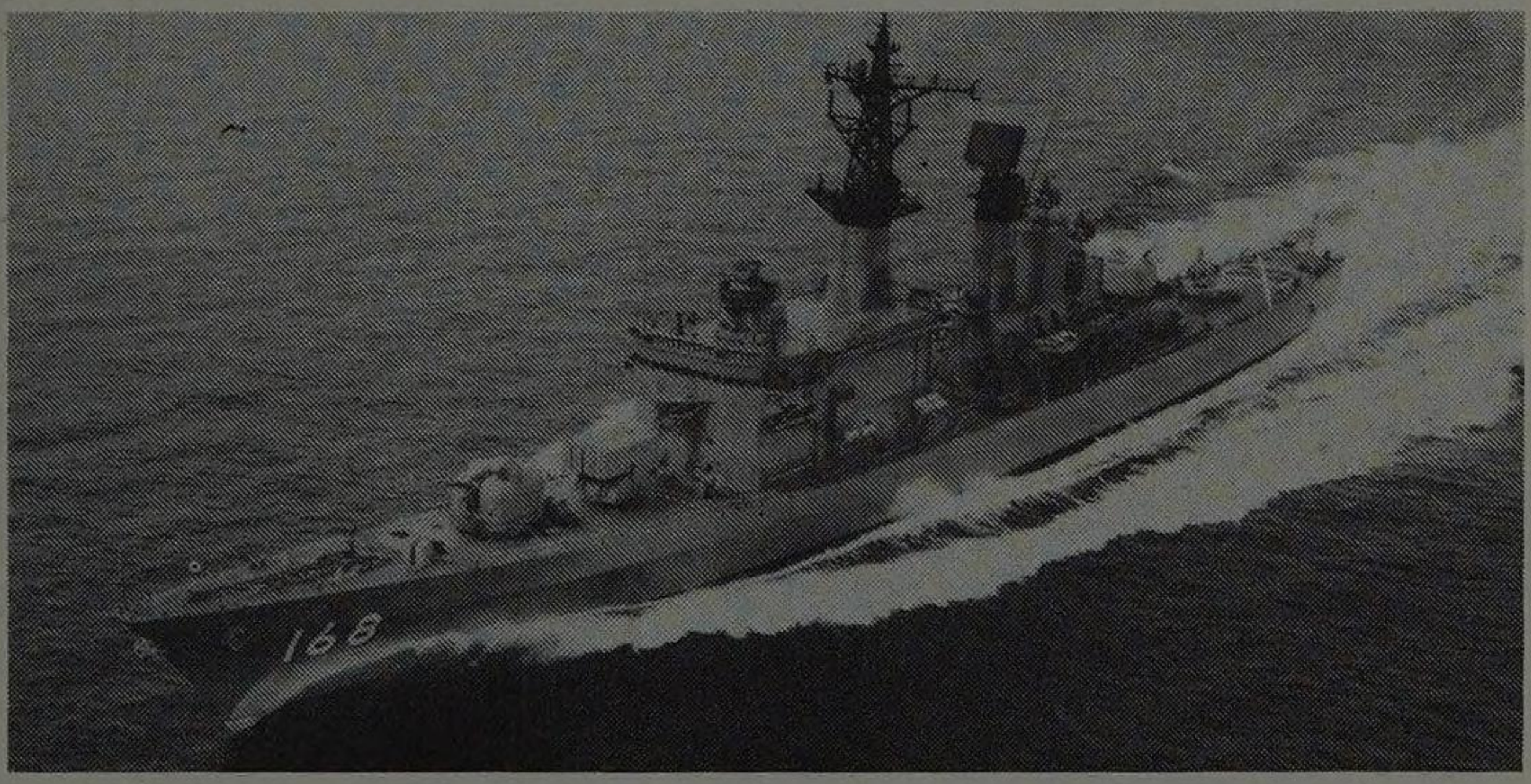
Modified Kashin/Kashin class Destroyers

Ognevoy, a Modified Kashin class destroyer.

Role: General-purpose. **Builders**: Various, USSR.
Users: Soviet and Indian Navies.
Basic data: c. 4,850 t full displacement; 479 ft (146 m) overall length; 51.85 ft (15.8 m) maximum beam. **Crew**: 280.
Propulsion: 4 gas turbines (total 96,000 shp); 2 propellers.
Sensors: 1 long-range air search radar; 2 height finder (3-D) radars; 2 surface search and nav radars; 4 fire control radars consisting of 2 separate systems; 1 hull-mounted sonar; 1 towed variable depth sonar (on Modified Kashins only).
Armament: 4 single SS-N-2 anti-ship missile launchers (Modified Kashins only); 2 twin SA-N-1 point air defence missile launchers; 2 twin 76 mm anti-aircraft guns; 4 single Gatling-type 30 mm anti-aircraft guns (Modified Kashins only); 5 heavyweight anti-submarine torpedo tubes; 2 twelve-barrel RB 6000 anti-submarine 250 mm rocket launchers (on all Kashins and on at least 1 Modified Kashin).
Top speed: 36 kt. **Range**: 5,000 nautical miles at 18 kt.
Programme: 20 Kashin class ships were constructed between 1962 and 1972 and 5 of these ships were known to have been converted to Modified Kashins commencing 1973. One Kashin sank in the Black Sea in August 1974 following an internal explosion. The Indian Government has ordered 3 of this class for early 1980s delivery.
Notes: The Kashin class guided missile destroyers were the first large gas-turbine powered ships to emerge anywhere in the world. Modified Kashins have an enlarged and elevated helicopter pad aft.

Tachikaze class

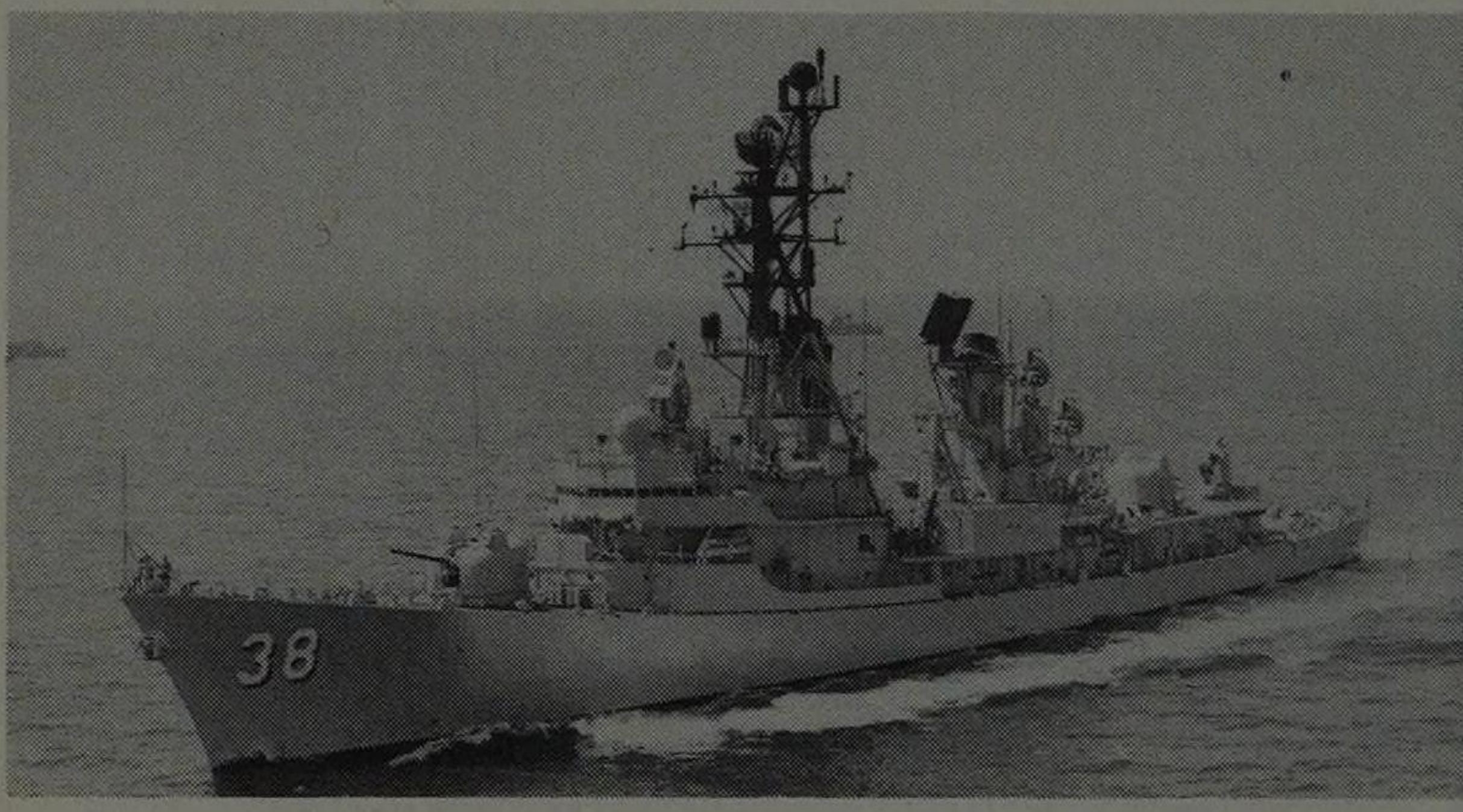
Destroyers



Tachikaze (D168) photographed at speed in 1976.

Role: Anti-aircraft. **Builder**: Mitsubishi, Japan.
User: Japanese Maritime Self-Defence Force.
Basic data: 4,800 t full displacement; 469.2 ft (143 m) overall length; 46.9 ft (14.3 m) maximum beam. **Crew**: 277.
Propulsion: 2 geared steam turbines (total 70,000 shp); 2 propellers.
Sensors: 1 OPS-17 surface search radar; 1 SPS-52B height finder (3-D) radar; 2 SPG-51 missile fire control radar; 1 GFCS 1 gun fire control radar; 1 OQS-3 hull-mounted sonar; automated action information data processing system.
Armament: 1 single Mk 13 launcher for Standard SM-1 MR area air defence missiles; 2 single 5 inch Mk 42 dual-purpose guns; 1 octuple ASROC anti-submarine missile launcher; 2 triple lightweight anti-submarine torpedo tubes.
Top speed: 32 kt. **Range**: In excess of 4,000 nautical miles.
Programme: This 3 ship class comprises *Tachikaze* (D168), *Asakaze* (D169) and the as yet unnamed D170. Laid down in 1973, 1976 and 1979, the first two ships entered service in March 1976 and March 1979, respectively, while the third destroyer is scheduled to enter service in March 1983.
Notes: Employing the same propulsive machinery as the somewhat heavier Haruna class destroyers, the Tachikaze class, along with the single Amatsukaze type destroyer, are the only Japanese warships to carry an area air defence capability. No helicopter is carried.

Charles F. Adams class Destroyers

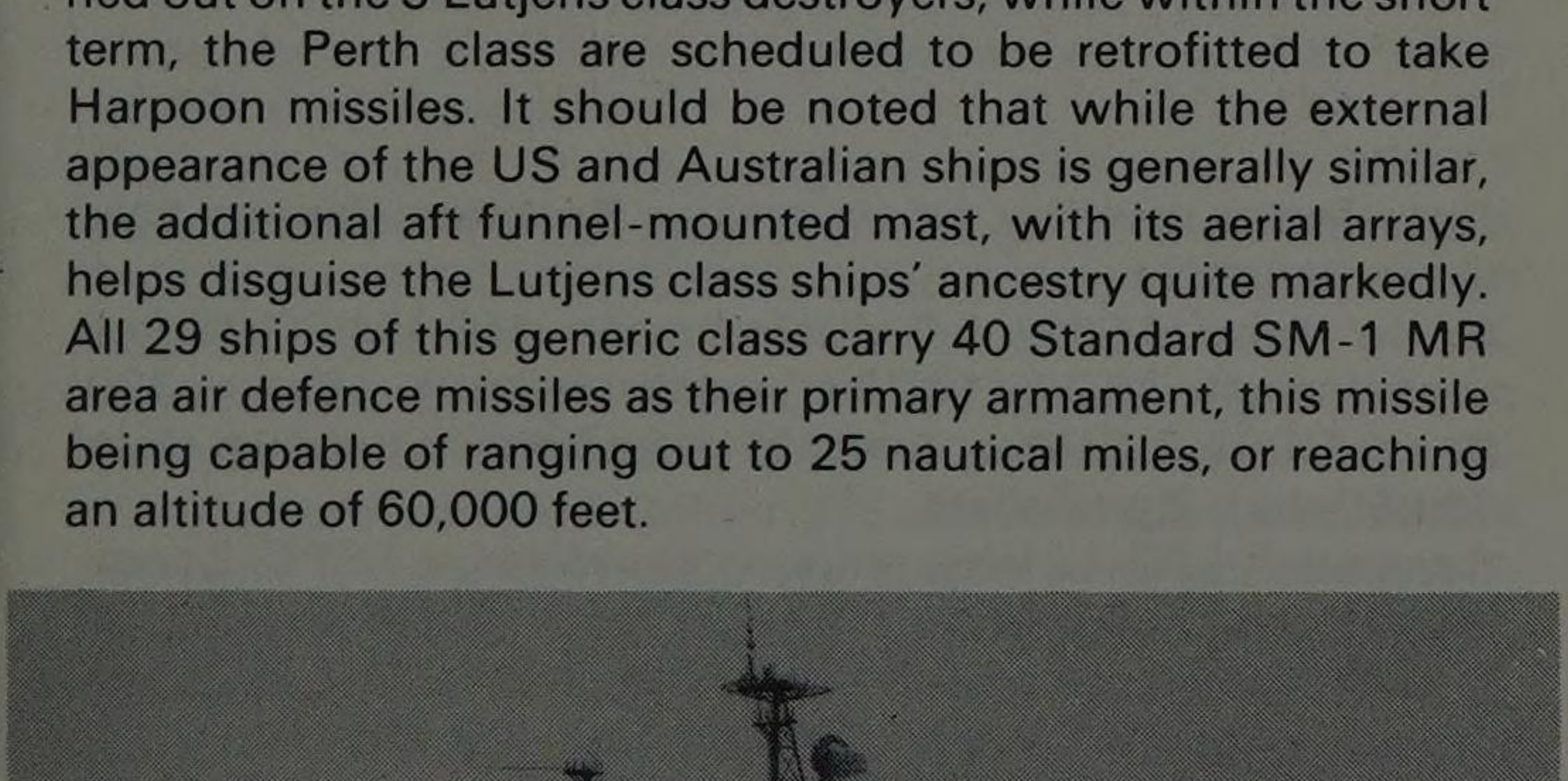


HMAS *Perth* (DDG38) of the Royal Australian Navy.

Role: Anti-aircraft. **Builders**: Various, USA.
Users: US Navy, Royal Australian Navy, Federal German Navy.
Basic data: 4,550 t full displacement; 437 ft (133.2 m) overall length; 47 ft (14.3 m) maximum beam. **Crew**: c. 330.
Propulsion: 2 General Electric or Westinghouse geared steam turbines (total 70,000 shp); 2 propellers.
Sensors: 1 SPS-29, -37 or -40 air search radar; 1 SPS-39 height finder (3-D) radar; 1 SPS-10 surface search and nav radar; 2 SPG-51C fire control radars (Tartar); 1 SPG-53 fire control radar (gun); 1 SPS-23 hull-mounted sonar.
Armament: 1 twin Mk 11 or 13 launcher for Tartar/Standard area air defence or Harpoon anti-ship missiles; 2 single 5 in Mk 42 guns; 1 octuple ASROC anti-submarine rocket launcher (replaced by 2 Ikara anti-submarine missile launchers in the 3 Australian ships); 2 triple lightweight anti-submarine torpedo tubes.
Top speed: 31 kt. **Range**: 4,500 nautical miles at 20 kt.
Programme: The 23 ship Charles F. Adams class was ordered for the US Navy between mid-1957 and mid-1961, all ships being laid down between 1958 and 1962. The lead ship, *USS Charles F. Adams* (DDG2), entered service during September 1960. By September 1964, all 23 vessels were in service, the class being numerically, if not chronologically, completed with the delivery of USS *Waddel* (DDG24). Australia bought 3 addi-

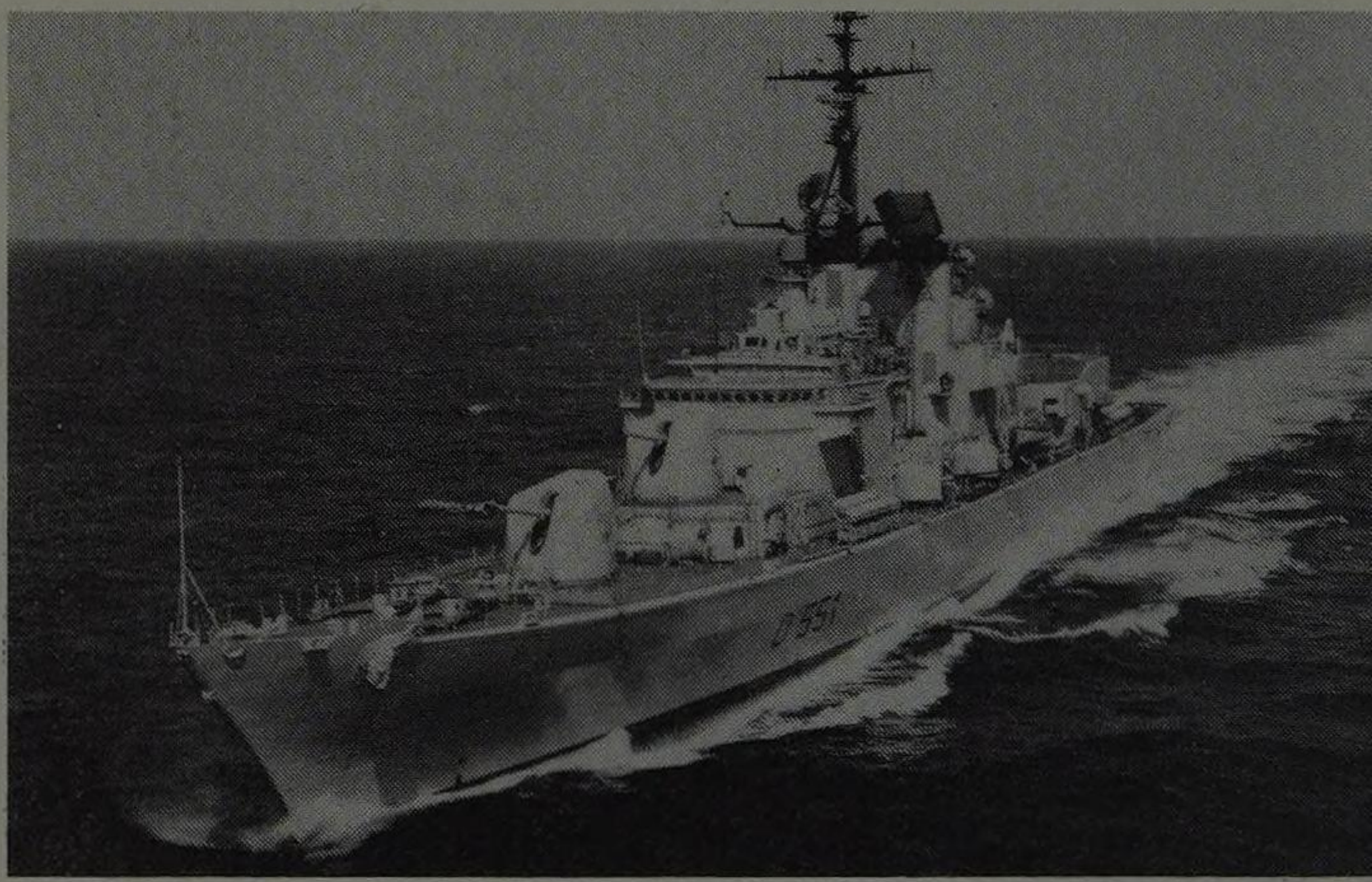
tional ships, HMAS *Perth* (DDG38), HMAS *Hobart* (DDG39) and HMAS *Brisbane* (DDG41), all 3 being accepted between July 1965 and December 1967. In service with the Royal Australian Navy, these vessels are referred to as **Perth class** ships. During 1964, the Federal German Government placed orders for a further 3 ships of this class, *Lutjens* (D185), *Molders* (D186) and *Rommel* (D187), all of which were accepted between March 1969 and May 1970 and are operated as **Lutjens class** destroyers.

Notes: Slightly smaller and lighter than the Coontz class guided missile destroyers that preceded the Adams into service with the US Navy, the Adams class ships still provide around one third of the US Navy's total task force anti-aircraft screening capability. Currently, the US vessels are undergoing an extensive modernisation of their shipboard electronics and action information systems, along with the installation of Harpoon missile systems. Similar electronics modernisation is being carried out on the 3 Lutjens class destroyers, while within the short term, the Perth class are scheduled to be retrofitted to take Harpoon missiles. It should be noted that while the external appearance of the US and Australian ships is generally similar, the additional aft funnel-mounted mast, with its aerial arrays, helps disguise the Lutjens class ships' ancestry quite markedly. All 29 ships of this generic class carry 40 Standard SM-1 MR area air defence missiles as their primary armament, this missile being capable of ranging out to 25 nautical miles, or reaching an altitude of 60,000 feet.



Federal German Navy's *Lutjens* (D185).

Audace class



Italy's *Audace* (D551) guided missile destroyer.

Role: Anti-submarine. **Builders**: Various, Italy.
User: Italian Navy.
Basic data: 4,560 t full displacement; 448.15 ft (136.6 m) overall length; 46.7 ft (14.23 m) maximum beam. **Crew**: 380.
Propulsion: 2 CNR or Ansoldo geared steam turbines (total 73,000 shp); 2 propellers.
Sensors: 1 SPS-12 long-range air search radar; 1 SPQ-2 combined air/sea search radar; 1 SPS-52 height finder (3-D) radar; 2 SPG-51B fire control radars (missile); 3 Selenia RTN-10X fire control radars (guns); 1 CWE 610 hull-mounted sonar.
Armament: 2 AB 204/212-sized or 1 SH-3-sized helicopter; 1 twin Mk 13 launcher for Standard SM-1 area air defence missiles; 2 single OTO-Melara 127 mm dual-purpose guns; 4 single OTO-Melara 76 mm anti-aircraft guns; 2 triple and 4 single lightweight anti-submarine torpedo tubes.
Top speed: 33.5 kt. **Range**: 4,000 nautical miles at 25 kt.
Programme: A 2 ship class, *Ardito* (D550) and *Audace* (D551), were ordered in 1968. Both entered service in 1972.
Notes: Extremely handsome and efficient ships, the Audace class carry a well-balanced weapons fit.

Takatsuki class

Destroyers

Takatsuki (DD164) of the Japanese Maritime Self-Defence Force.

Role: Anti-submarine.

Builders: Various, Japan.

User: Japanese Maritime Self-Defence Force.

Basic data: 4,500 t full displacement; 446.8 ft (136 m) overall length; 44 ft (13.4 m) maximum beam.

Crew: 270.

Propulsion: 2 Mitsubishi geared steam turbines (total 60,000 shp); 2 propellers.

Sensors: 1 OPS 11 long-range air search radar; 1 OPS 17 surface search and nav radar; 2 Mk 35 gun fire control radars; 1 OQS 3 or 1 SQS-23 hull-mounted sonar; 1 SQS 35 towed variable depth sonar.

Armament: 2 single 5 inch Mk 42 dual-purpose guns; 1 octuple Mk 16 launcher for ASROC anti-submarine missiles; 1 quadruple-barrelled Bofors 375 mm anti-submarine rocket launcher; 2 triple lightweight anti-submarine torpedo tubes.

Top speed: 32 kt.

Range: 7,000 nautical miles at 20 kt.

Programme: A 4 ship class comprising *Takatsuki* (DD164), *Kikizuki* (DD165), *Mochizuki* (DD166) and *Nagatsuki* (DD167), with all but the Mitsubishi-built DD165 being produced in the yards of Ishikawajima. Laid down between October 1965 and March 1968, the class entered service between March 1967 and February 1970.

Notes: A relatively large ship, the *Takatsuki* and her sisters have a formidable anti-submarine weapons fit, a modest, gun-only, anti-ship capability and almost no effective anti-air defences. However, all 4 ships are to undergo a modernisation programme during the first half of the 1980s. No helicopters are currently carried.

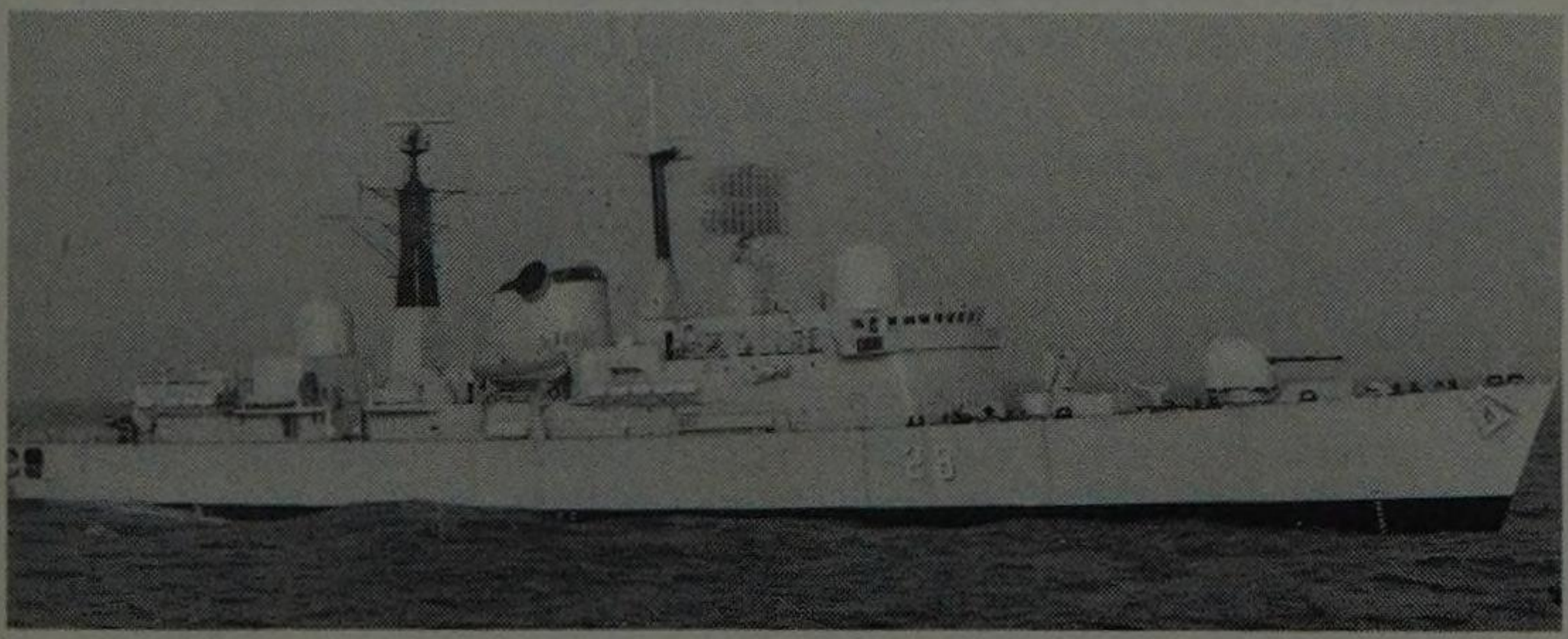
Sheffield class Destroyers

HMS *Southampton* (D90) on sea trials, 1981.

Role: Area air defence. **Builders**: Various, UK and Argentina.
Users: Royal Navy and Argentinian Navy.
Basic data: 4,250 t full displacement; 410 ft (125 m) overall length; 47 ft (14.3 m) maximum beam. **Crew**: 280.
Propulsion: 2 Rolls-Royce TM3B Olympus gas turbines (total derated 50,000 shp) or 2 Rolls-Royce Tyne RM1A gas turbines (total 7,600 shp); COGOG; 2 c-p propellers.
Sensors: 1 Type 965M long-range air search radar; 1 Type 992Q low-altitude air search radar; 2 Type 909 fire control radars (Sea Dart); 1 Type 1006 surface search and nav radar; Types 162, 170B, 174 and 184 hull-mounted sonar systems; Ferranti ADAWS 4 automated action data processing.
Armament: 1 Westland Lynx helicopter; 1 twin Mk 30 Sea Dart area air defence missile launcher; 1 single 4.5 inch Vickers Mk 8 dual-purpose gun; 2 single 20 mm Mk 7 Oerlikon anti-aircraft guns; 2 triple lightweight anti-submarine torpedo tubes.
Top speed: 28 kt. **Range**: 4,500 nautical miles at 18 kt.
Programme: A 16 ship class, comprising 10 standard, plus 4 stretched ships for the Royal Navy and 2 standard ships for Argentina. The Royal Navy ships were ordered on an incremental basis over an extended period commencing November 1968 and concluding in April 1979. The 10 standard Royal Navy Sheffields, or Type 42 destroyers, along with the year of their acceptance into service, are : HMS *Sheffield* (D80) 1975, HMS *Birmingham* (D86) 1976, HMS *Newcastle* (D87) 1978, HMS

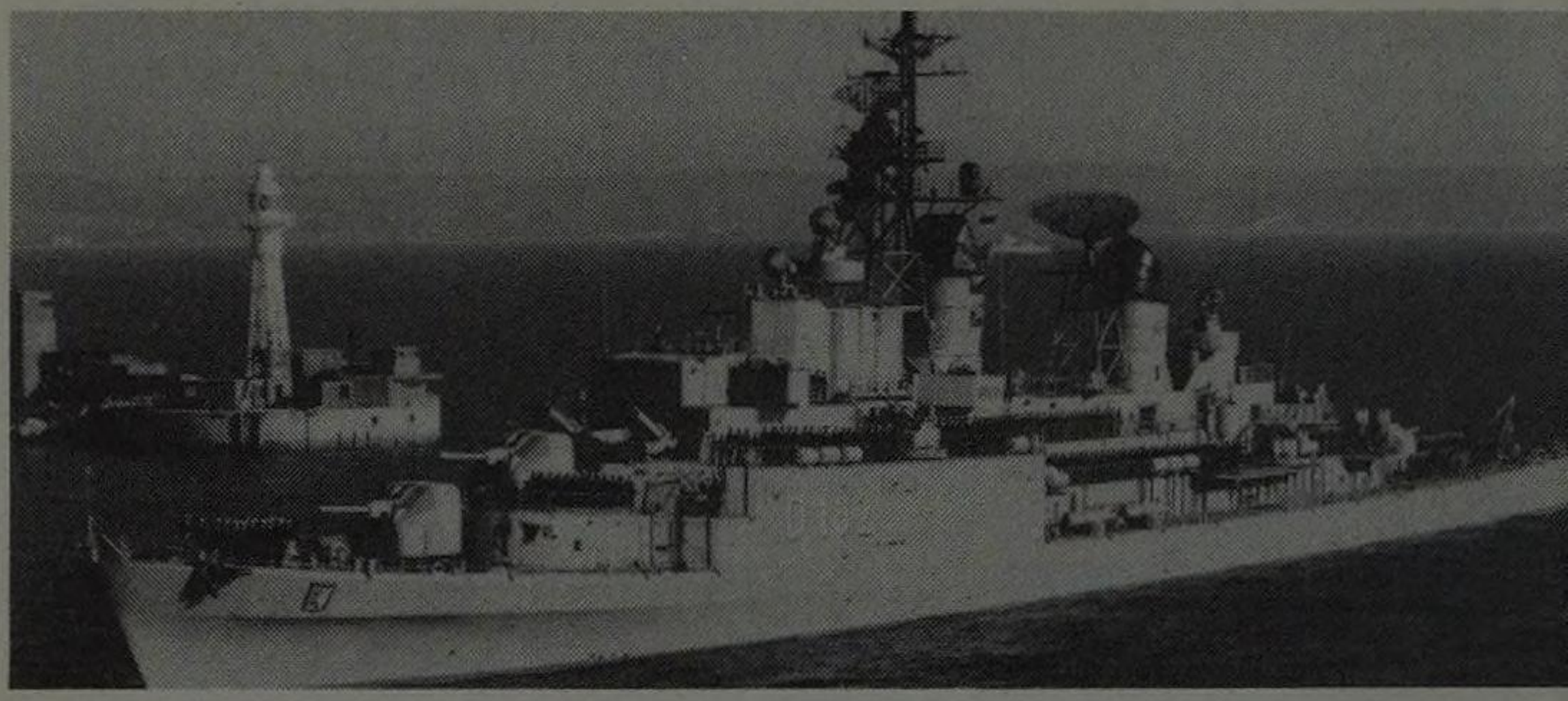
Coventry (D118) 1978, HMS *Glasgow* (D88) 1979, HMS *Cardiff* (D108) 1979, HMS *Exeter* (D89) 1980, HMS *Southampton* (D90) 1981, HMS *Nottingham* (D91) 1982 and HMS *Liverpool* (D92) 1982. The 2 Argentinian Type 42s, ARA *Hercules* (D28) and ARA *Santisima Trinidad* (D29), built by Vickers and the Argentine Naval Dockyards, respectively, were accepted in 1976 and 1980. Four stretched Type 42s, HMS *Manchester* (D95), HMS *Gloucester* (D96), HMS *Edinburgh* (D97) and HMS *York* (D98), are in build or fitting out. Both HMS *Sheffield* (D80) and HMS *Coventry* (D118) were lost to enemy action in May 1982.

Notes: Designed as replacement for the County class destroyers, the Sheffield class, or Type 42s, are a much more compact and austere ship than their forebears. The primary role of the Type 42s is to provide area air defence for the ships that they are accompanying. Because of their long-range sensor fit, the Sheffield class are also a logical choice to act as radar pickets, sailing ahead of a task group to act as its eyes and ears. Regrettably, as the loss of HMS *Sheffield* and HMS *Coventry* demonstrated, the designers of the Type 42 and, for that matter, the later stretched Type 42s, either put too much faith in the efficacy of the ship's sensor/weapons capability, or had too little appreciation of the effectiveness of a low-level air strike. Such attacks delivered either by sea-skimming missile or manned aircraft are best countered by either a rapid reaction, short-range air defence missile system, or as most of the world's navies appear to prefer, a rapid rate of fire, radar-directed gun system, neither of which is fitted to the Type 42s.



ARA *Hercules* (D28) of the Argentinian Navy, 1976.

Modified Hamburg class Destroyers



Schleswig-Holstein (D182) after modernisation.

Role: General-purpose.
Builder: Blohm und Voss, Federal Germany.
User: Federal German Navy.
Basic data: 4,400 t full displacement; 439.6 ft (134 m) overall length; 44 ft (13.4 m) maximum beam. **Crew**: 280.
Propulsion: 2 geared steam turbines (total 68,000 shp); 2 fixed-pitched propellers.
Sensors: 1 Hollandse DA 08 long-range air search radar; 1 Hollandse SGR 103 low-level air and sea search radar; 1 Hollandse SGR 105 surface search radar; 3 Hollandse M45 fire control radars; 1 Atlas hull-mounted sonar.
Armament: 4 Exocet anti-ship missile launchers; 3 single 100 mm dual-purpose guns; 4 twin Breda 40 mm anti-aircraft guns; 4 single heavyweight anti-submarine torpedo tubes; 2 quadruple-barrelled Bofors 375 mm anti-submarine rocket launchers; mines.
Top speed: 35 kt. **Range**: 5,000 nautical miles at 18 kt.
Programme: Laid down between January 1959 and February 1961, this 4 ship class comprises *Hamburg* (D181), *Schleswig-Holstein* (D182), *Bayern* (D183) and *Hessen* (D184). The ships entered service in March 1964, October 1964, July 1965 and October 1968, respectively. All 4 destroyers underwent major modernisation between November 1974 and December 1976, during which Exocets replaced what had been the third, or 'X' positioned gun turret.
Notes: Despite their inability to operate helicopters, these ships pack a considerable anti-ship punch out to about 30 miles.

Iroquois class Destroyers

HMCS *Huron* (DDH281) helicopter-carrying destroyer.

Role: Anti-submarine.
Builders: Marine Industries & Davie, Canada.
User: Canadian Armed Forces, Marine Command.
Basic data: 4,200 t full displacement; 425 ft (129.5 m) overall length; 50 ft (15.2 m) maximum beam. **Crew**: 285.
Propulsion: 2 Pratt & Whitney FT4 gas turbines (total 50,000 shp) or 2 Pratt & Whitney FT12 gas turbines (total 7,400 shp); COGOG; 2 c-p propellers.
Sensors: 1 SPS-502 long-range air search radar; 1 SPQ-2D air and sea search radar; 2 Hollandse WM22 fire control radars; 3 sonars, comprising SQS-501 and SQS-505 hull-mounted and SQS-505 towed variable depth sonar; Litton automated action data processing.
Armament: 2 Sikorsky Sea King helicopters; 1 OTO-Melara 127 mm dual-purpose gun; 2 quadruple Sea Sparrow point air defence missile launchers; 1 Mk 10 Limbo anti-submarine mortar; 2 triple lightweight anti-submarine torpedo tubes.
Top speed: 29 kt. **Range**: 4,500 nautical miles at 20 kt.
Programme: A 4 ship class, the first two ships, HMCS *Iroquois* (DDH280) and HMCS *Huron* (DDH281), were both built by Marine Industries, being both laid down in January 1969. The other pair, HMCS *Athabascan* (DDH282) and HMCS *Algonquin* (DDH283), were laid down by Davie Shipbuilders in June and September 1969, respectively. The acceptance dates of all 4 ships were: July 1972, December 1972, November 1972 and September 1973.
Notes: The ship's 'boxy' superstructure sports V-shaped funnels.

Georges Leygues class Destroyers

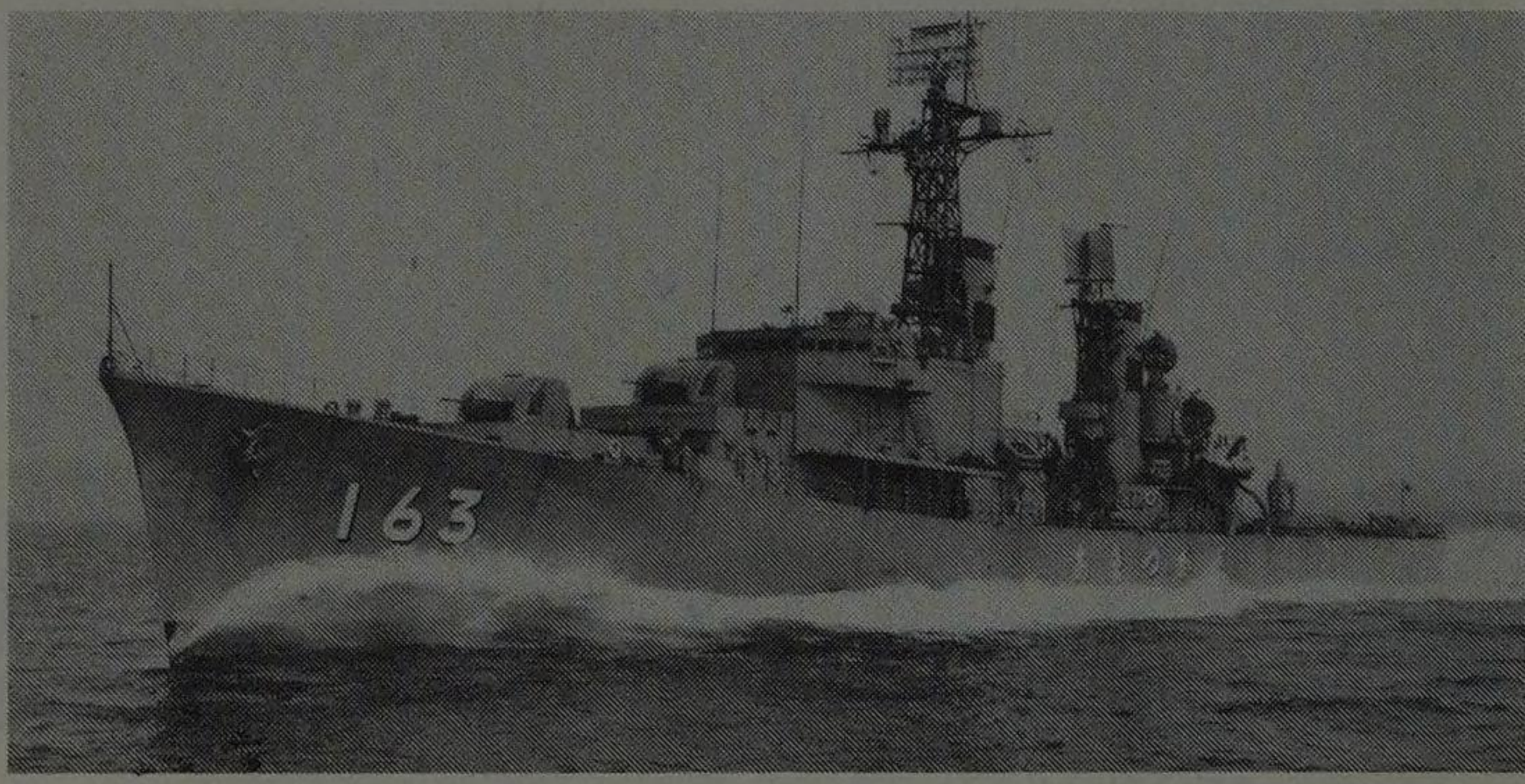
Georges Leygues (D640), lead ship of a 6 ship class.

Role: Anti-submarine. **Builder**: DCAN Brest, France.
User: French Navy.
Basic data: 4,170 t full displacement; 456 ft (139 m) overall length; 45.9 ft (14 m) maximum beam. **Crew**: 216.
Propulsion: 2 Rolls-Royce TM3B Olympus gas turbines (total 56,000 shp) or 2 SEMT-Pielstick 16 PA 6 CV diesels (10,400 bhp); CODOG; 2 c-p propellers.
Sensors: 1 DRBV 51 long-range air search radar; 1 DRBV 26 low-level air search radar; 1 DRBC 32 fire control radar; 2 Decca 1226 nav radars; 1 DUBV 23 hull-mounted sonar; 1 DUBV 43 variable depth sonar; SENIT 4 automated action information data processing system.
Armament: 2 Westland Lynx helicopters; 4 Exocet anti-ship missile launchers; 1 single 100 mm Model 1968 dual-purpose gun; 1 octuple Crotale point air defence missile launcher; 2 single 20 mm anti-aircraft guns; 2 heavyweight anti-submarine torpedo catapults.
Top speed: 30 kt. **Range**: 9,500 nautical miles at 17 kt.
Programme: This 6 ship class comprises: *Georges Leygues* (D640), *Dupleix* (D641), *Montcalm* (D642), *Jean De Vienne* (D643), plus the as yet unnamed D644 and D645. *Georges Leygues* entered service in October 1979, *Dupleix* in January 1981 and the *Montcalm* in July 1982. All will be in service by late 1986.
Notes: The design is extremely compact, with a powerful anti-ship and anti-air secondary armament.

Converted Sherman class Destroyers

USS *Decatur* (DDG31) off San Diego, June 1976.

Role: Anti-aircraft.
Builders: Various, USA.
User: US Navy.
Basic data: 4,150 t full displacement; 418 ft (127.4 m) overall length; 45 ft (13.7 m) maximum beam. **Crew**: 340.
Propulsion: 2 General Electric (Westinghouse in DDG32) geared steam turbines (total 70,000 shp); 2 propellers.
Sensors: 1 SPS-29E (1 SPS-40 in DDG34) air search radar; 1 SPS-48 height finder (3-D) radar; 1 SPS-10B surface search radar; 1 SPG-51C missile fire control radar; 1 SPG-53B gun fire control radar; 1 SQS-23 hull-mounted sonar.
Armament: 1 single Mk 13 launcher for Tartar/Standard MR area air defence missiles; 1 single 5 inch Mk 42 dual-purpose gun; 1 octuple Mk 16 ASROC anti-submarine missile launcher; 2 triple lightweight anti-submarine torpedo tubes.
Top speed: 32.5 kt. **Range**: 4,500 nautical miles at 20 kt.
Programme: Originally laid down between 1954 and 1957 as Forrest Sherman class ships, these destroyers, sometimes referred to as **Decatur class**, comprise USS *Decatur* (DDG31), USS *John Paul Jones* (DDG32), USS *Parsons* (DDG33) and USS *Somers* (DDG34). These ships entered service in their current guise between April 1967 and February 1968.
Notes: While converting existing destroyers is clearly much more economic than building new ones, the deployment of these elderly, largely aluminium superstructured ships to the US Pacific Fleet (until 1980 considered the less demanding in operational terms) tends to indicate that they are considered of limited usefulness.



The sole of type *Amatsukaze* (D163).

Role: Anti-aircraft. **Builder**: Mitsubishi, Japan.
User: Japanese Maritime Self-Defence Force.
Basic data: 4,000 t full displacement; 429.8 ft (131 m) overall length; 44 ft (13.4 m) maximum beam. **Crew**: 290.
Propulsion: 2 Ishikawajima-General Electric geared steam turbines (total 60,000 shp); 2 propellers.
Sensors: 1 SPS-29 air search radar; 1 SPS-52 height finder (3-D) radar; 1 OPS-17 surface search radar; 2 SPG-51 missile fire control radars; 2 SPG-34 gun fire control radars; 1 SQS-23 hull-mounted sonar.
Armament: 1 single Mk 13 launcher for Standard SM-1 MR area air defence missiles; 2 twin 76 mm dual-purpose guns; 1 octuple ASROC anti-submarine missile launcher; 2 triple light-weight anti-submarine torpedo tubes; 2 Mk 15 Hedgehog anti-submarine launchers.
Top speed: 33 kt. **Range**: 7,000 nautical miles at 18 kt.
Programme: This sole example, the *Amatsukaze* (D163), was laid down in November 1962, launched in October 1963 and entered service in February 1965. The ship underwent a major refit in 1967 when it was equipped with its SPS-52 height finding radar and its torpedo tubes.
Notes: The first guided missile destroyer to be designed in Japan, twin funnelled *Amatsukaze* bears a strong resemblance to the classic Japanese destroyers of World War II. Despite the clear deck area aft, the ship cannot operate helicopters.

Roger de Lauria class Destroyers

The Spanish Navy's *Roger de Lauria* (D42) destroyer, 1978.

Role: Anti-submarine. **Builder**: Bazan, Spain.
User: Spanish Navy.
Basic data: 3,785 t full displacement; 382.8 ft (116.68 m) overall length; 41 ft (12.5 m) maximum beam. **Crew**: 255.
Propulsion: 2 Rateau-Bretagne geared steam turbines (total 60,000 shp); 2 propellers.
Sensors: 1 SPS-40 long-range air search radar; 1 SPS-10B surface search radar; 1 Mk 25 and 1 Mk 35 fire control radars; 1 SQS-32 hull-mounted sonar; 1 SQA-10 towed, variable depth sonar.
Armament: 1 Hughes 500 helicopter; 3 twin 127 mm dual-purpose guns; 2 triple and 2 fixed lightweight anti-submarine torpedo tubes.
Top speed: 28 kt. **Range**: 4,500 nautical miles at 15 kt.
Programme: During 1944, the Spanish Navy initiated a building programme for a 9 ship class to be led by *Oquendo* (D41), based on the German Navy's Narvik class destroyer. Laid down in March 1951, the *Oquendo* proved to be far from satisfactory and work on the second and third ships, the *Roger de Lauria* (D42) and *Marques de la Ensenada* (D43), was suspended as the instability problems of the *Oquendo* emerged. After some considerable redesign, the second and third Oquendos entered service with the Spanish Navy in May 1969 and September 1970 as the 2 ship Roger de Lauria class.
Notes: Need to operate in company with air-defence capable ships.

Daring class

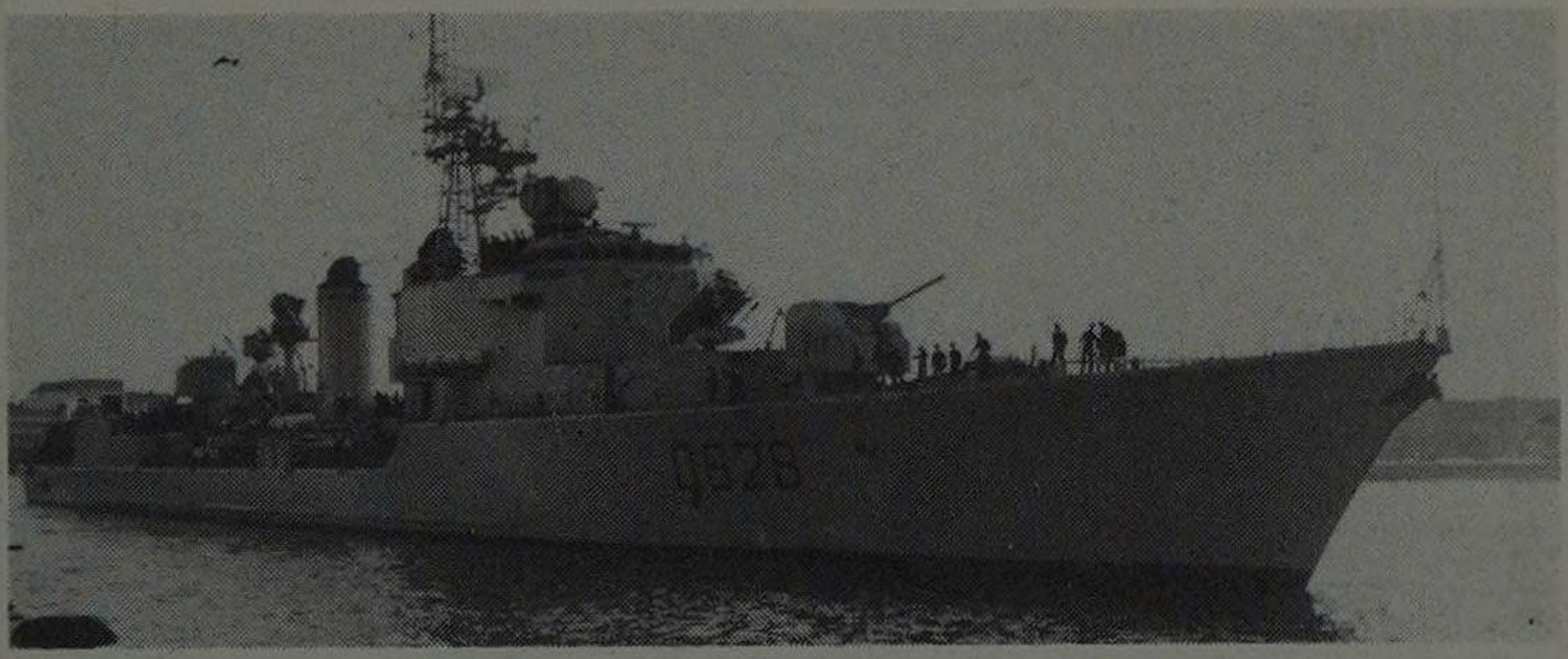
Destroyers

The two Australian-built Daring class destroyers, 1976.

Role: General-purpose. **Builders**: Various UK and Australian.
User: Royal Australian Navy.
Basic data: 3,700 t full displacement; 390 ft (118.9 m) overall length; 43 ft (13.1 m) maximum beam. **Crew**: 321.
Propulsion: 2 Parsons geared steam turbines (total 54,000 shp); 2 propellers.
Sensors: 1 Hollandse LW02 long-range air search radar; 1 Hollandse nav radar; 2 Hollandse M22 fire control radars; 3 sonars (Types 162, 170 and 174).
Armament: 3 twin 4.5 inch dual-purpose Mk 6 guns; 2 twin and 2 single Bofors 40 mm anti-aircraft guns; 1 triple-barrel Limbo anti-submarine mortar.
Top speed: 32 kt. **Range**: 3,700 nautical miles at 20 kt.
Programme: In the late 1940s, the Australian Government decided to procure 2 locally built examples of the Royal Navy's Daring class destroyer. The lead Australian ship, HMAS *Vendetta* (D08), was laid down at the Naval Dockyard, Williamstown, in July 1949 and commissioned in November 1958. The second Australian ship, HMAS *Vampire* (D11), was laid down at the Cockatoo Island yards, Sydney, in July 1952 and was commissioned in June 1959. Both of these vessels went through a major modernisation programme in 1972. A third Daring class destroyer, HMAS *Duchess* (D154), was purchased from the Royal Navy in 1972 for use as a training ship.
Notes: HMAS *Vendetta* (D08) was paid off in October 1979 and is now in reserve, whereas HMAS *Vampire* (D11) remains in service.

D'Estrees class

Destroyers



The D'Estrees class destroyer *Vauquelin* (D628), 1978.

Role: Anti-submarine. **Builders**: DCAN (various), France.
User: French Navy.
Basic data: 3,740 t full displacement; 434.7 ft (132.5 m) overall length; 41.7 ft (12.72 m) maximum beam. **Crew**: 269.
Propulsion: 2 Rateau geared steam turbines (total 63,000 shp); 2 propellers.
Sensors: 1 DRBV 22A air search radar; 1 DRBV 50 surface search radar; 1 Decca/DRBN 32 nav radar; 2 SPG-51C fire control radars (Malafon); 2 DRBC 32A fire control radars (100 mm guns); 1 DUBV 23 hull-mounted sonar; 1 DUBV 43 towed variable depth sonar.
Armament: 2 100 mm Model 1968 dual-purpose guns; 1 Malafon anti-submarine missile launcher (13 missiles); 1 twin Oerlikon 20 mm anti-aircraft gun; 1 sextuple Bofors 375 mm anti-submarine rocket launcher; 2 triple heavyweight anti-submarine torpedo tubes.
Top speed: 32 kt. **Range**: 5,000 nautical miles at 18 kt.
Programme: Five Type 47 destroyers completed in 1956/7 were converted and modernised to undertake anti-submarine duties between the beginning of 1968 and 1971. These D'Estees class vessels as they are known comprise: *Maille Breze* (D627), *Vauquelin* (D628), *D'Estrees* (D629), *Casabianca* (D631) and *Guepratte* (D632).
Notes: Embodying the traditionally handsome lines of the heavy twin-funnelled French destroyers of the inter-war years, the D'Estrees class's primary anti-submarine armament consists of the Latecoere-designed Malafon missile with a range of up to 6.5 nautical miles and a speed of around 500 mph.

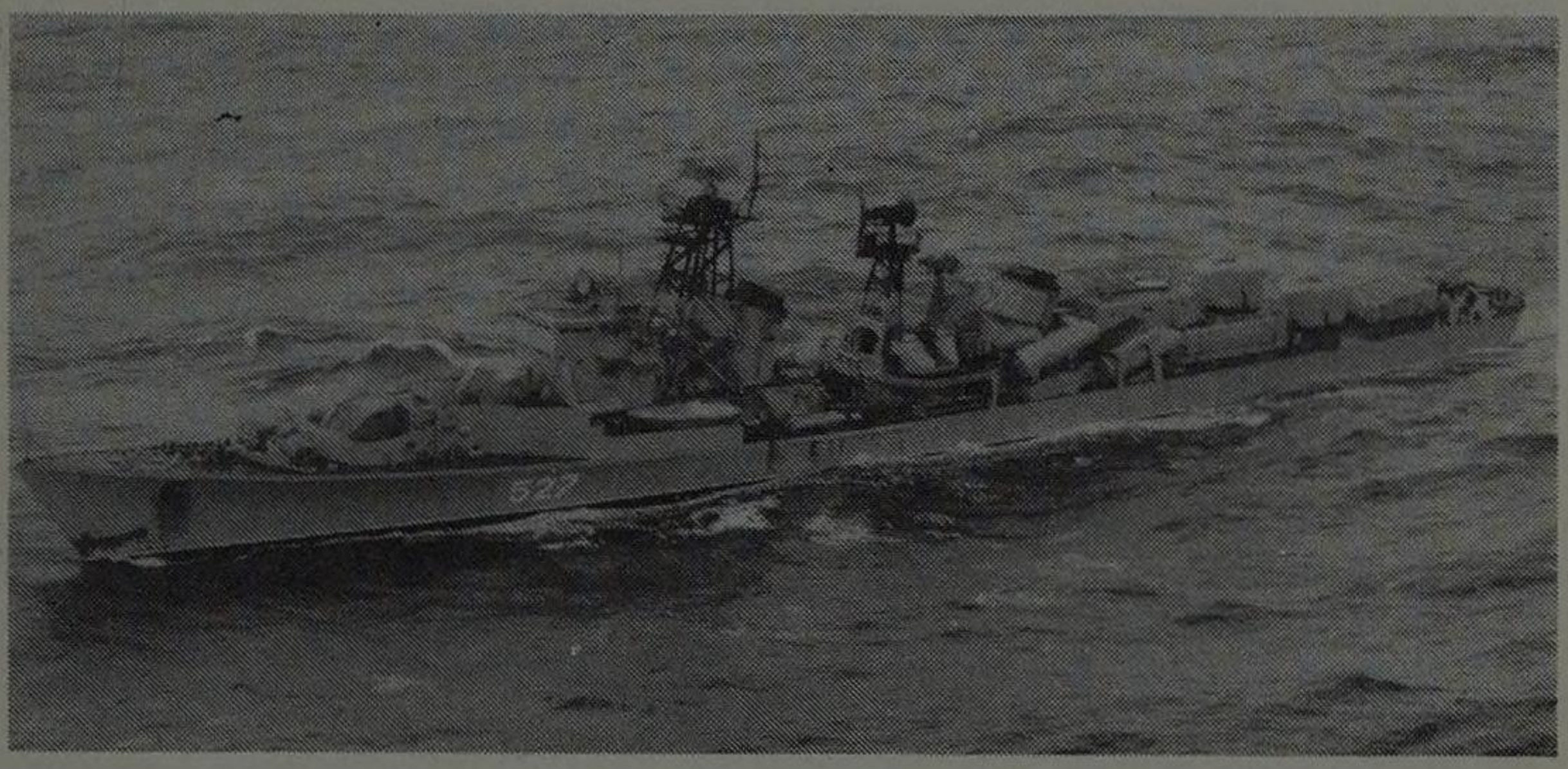
Gearing class

Destroyers

Sachtouris (D214) serves with the Greek Navy.

Role: Anti-submarine. **Builders**: Various, USA.
Users: Navies of Argentina, Brazil, Ecuador, Greece, Mexico, Pakistan, South Korea, Spain, Taiwan and US Naval Reserve.
Basic data: 3,520 t full displacement; 390.5 ft (119 m) overall length; 40.85 ft (12.45 m) maximum beam. **Crew**: c. 275.
Propulsion: 2 geared steam turbines (total 60,000 shp); 2 propellers.
Sensors: 1 SPS-40 long-range air search radar; 1 SPS-10 surface search radar; 1 SQS-23 hull-mounted sonar.
Armament: The original weapons fit comprised: 3 twin 5 inch guns; 12 single 40 mm anti-aircraft guns; 10 heavyweight anti-submarine torpedo tubes (some ships had 16 anti-aircraft guns, no torpedoes). Most ships currently operate with only 2 twin 5 inch guns and 2 triple lightweight anti-submarine torpedo tubes. Argentine ships carry 2 twin Exocet anti-ship missile launchers, while South Korean ships carry 2 quadruple Harpoon anti-ship missile launchers; 1 octuple ASROC anti-submarine missile launcher is fitted to ships of the Brazilian, Pakistani and Spanish navies. Argentinian, Greek and Spanish vessels have a helicopter pad immediately aft of the rear superstructure.
Top speed: 33 kt. **Range**: 4,000 nautical miles at 20 kt.
Programme: A 98 ship class built between 1945 and 1952.
Notes: Essentially the Allen M. Sumner class design stetched by 14 feet (4.27 m) amidships. Around 45 remain in service.

Modified Kildin/Kildin class Destroyers



A Modified Kildin class Soviet destroyer.

Role: Anti-ship. **Builders**: Various, USSR.
User: Soviet Navy.
Basic data: 3,500 t full displacement; 413 ft (126 m) overall length; 42.3 ft (12.9 m) maximum beam. **Crew**: 300.
Propulsion: 2 geared steam turbines (total 72,000 shp); 2 propellers.
Sensors: 1 long-range air search radar; 1 surface search and nav radar; 3 fire control radars; 1 hull-mounted sonar.
Armament: 4 single SS-N-2C anti-ship missile launchers on Modified ships only (1 single SS-N-1 anti-ship cruise missile launcher on sole Kildin); 2 twin 76 mm anti-aircraft guns on Modified ships only; 4 quadruple 57 mm anti-aircraft guns; 2 RB6000 twelve-barrel 250 mm anti-submarine rocket launchers; 2 twin heavyweight anti-submarine torpedo tubes.
Top speed: 34 kt. **Range**: 4,000 nautical miles at 18 kt.
Programme: This 4 ship class completed at the close of the 1950s comprises: *Bedovy*, *Neuderzhimyy*, *Prozorlivyy* and *Neulovimyy*. All but the latter ship were converted to Modified Kildins between 1973 and 1975. It is doubtful if the remaining vessel, which serves with the Soviet Pacific fleet, will be converted.
Notes: A development of the earlier Kotlin class anti-submarine destroyers, the Kildins represent an interim design solution to the anti-carrier centred task group ship requirement being penned by Admiral Gorshkov, architect of the modern Soviet Navy.

Allen M. Sumner class Destroyers

Rio Grande do Norte (D37) of the Brazilian Navy.

Role: Anti-submarine.

Builders: Various, USA.

Users: Navies of Argentina, Brazil, Columbia, Greece, Iran, South Korea, Taiwan, Turkey and Venezuela.

Basic data: 3,320 t full displacement; 376.5 ft (114.8 m) overall length; 41 ft (12.5 m) maximum beam. **Crew**: c. 265.

Propulsion: 2 geared steam turbines (total 60,000 shp); 2 propellers.

Sensors: 1 SPS-40 long-range air search radar; 1 SPS-10 surface search and nav radar; Mk 25 fire control radar; 1 SQS-29 hull-mounted sonar (some ships have SQA-10 variable depth sonar).

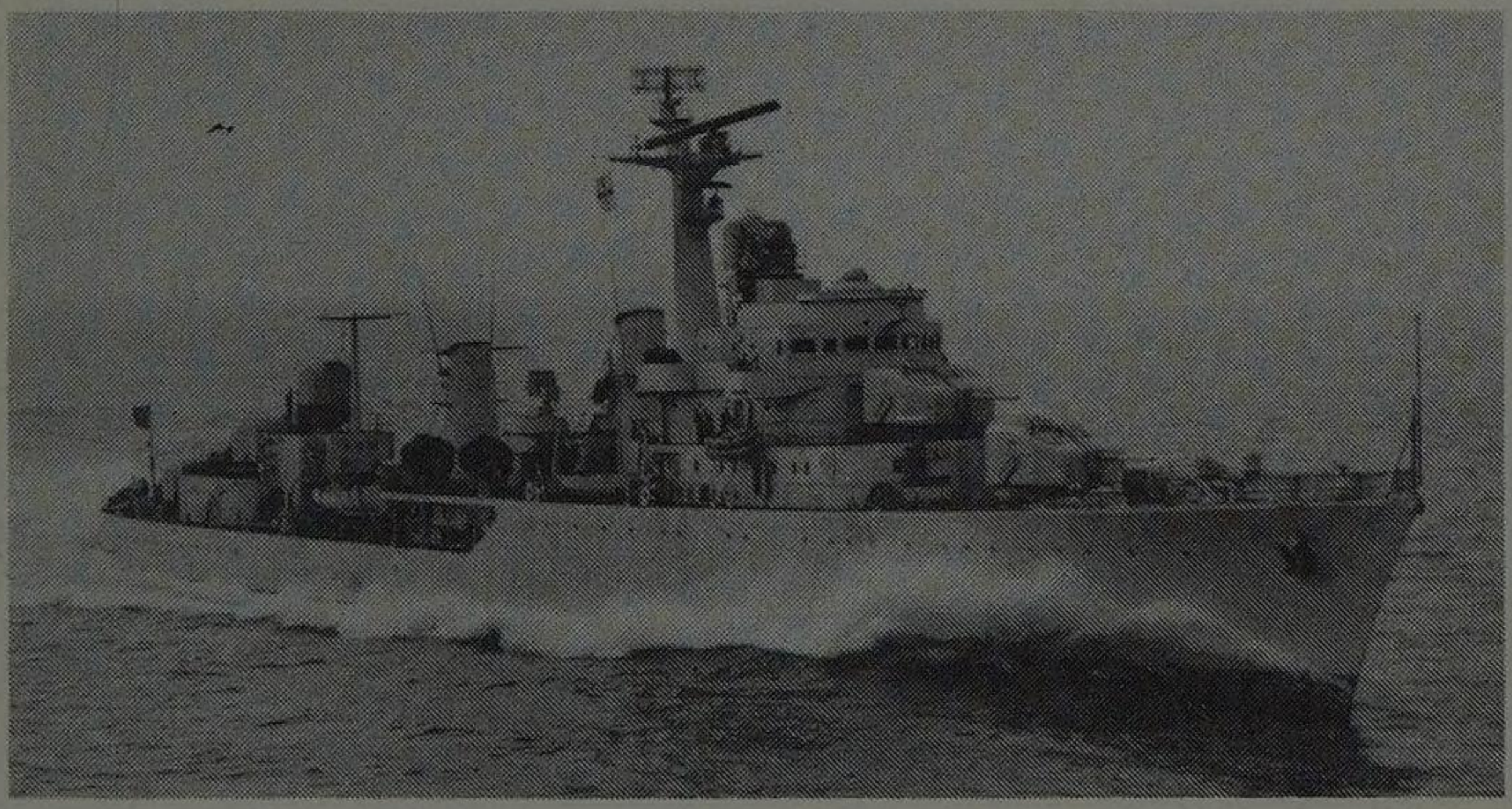
Armament: Originally comprised: 3 twin 5 inch guns; 12 single 40 mm anti-aircraft guns; 10 heavyweight anti-submarine torpedo tubes. Currently, all but the ships of Argentina and Iran retain the full 5 inch gun fit. All ships now carry 6 lightweight anti-submarine torpedo tubes in place of the heavyweight originals. In terms of anti-ship missiles, the Argentinians carry 2 twin Exocet, while the Iranian ships have 2 quadruple Harpoon launchers plus 1 quadruple Standard area air defence missile launcher. The Brazilian ships carry 1 quadruple Seacat point air defence missile launcher. Virtually all ships can operate 1 helicopter.

Top speed: 33 kt. **Range**: 4,400 nautical miles at 15 kt.

Programme: Originally a 58 ship class built between 1942 and 1943, 4 were lost during World War II, with a 5th scrapped in 1947.

Notes: 24 remain in service at the time of going to press.

Almirante Williams class Destroyers

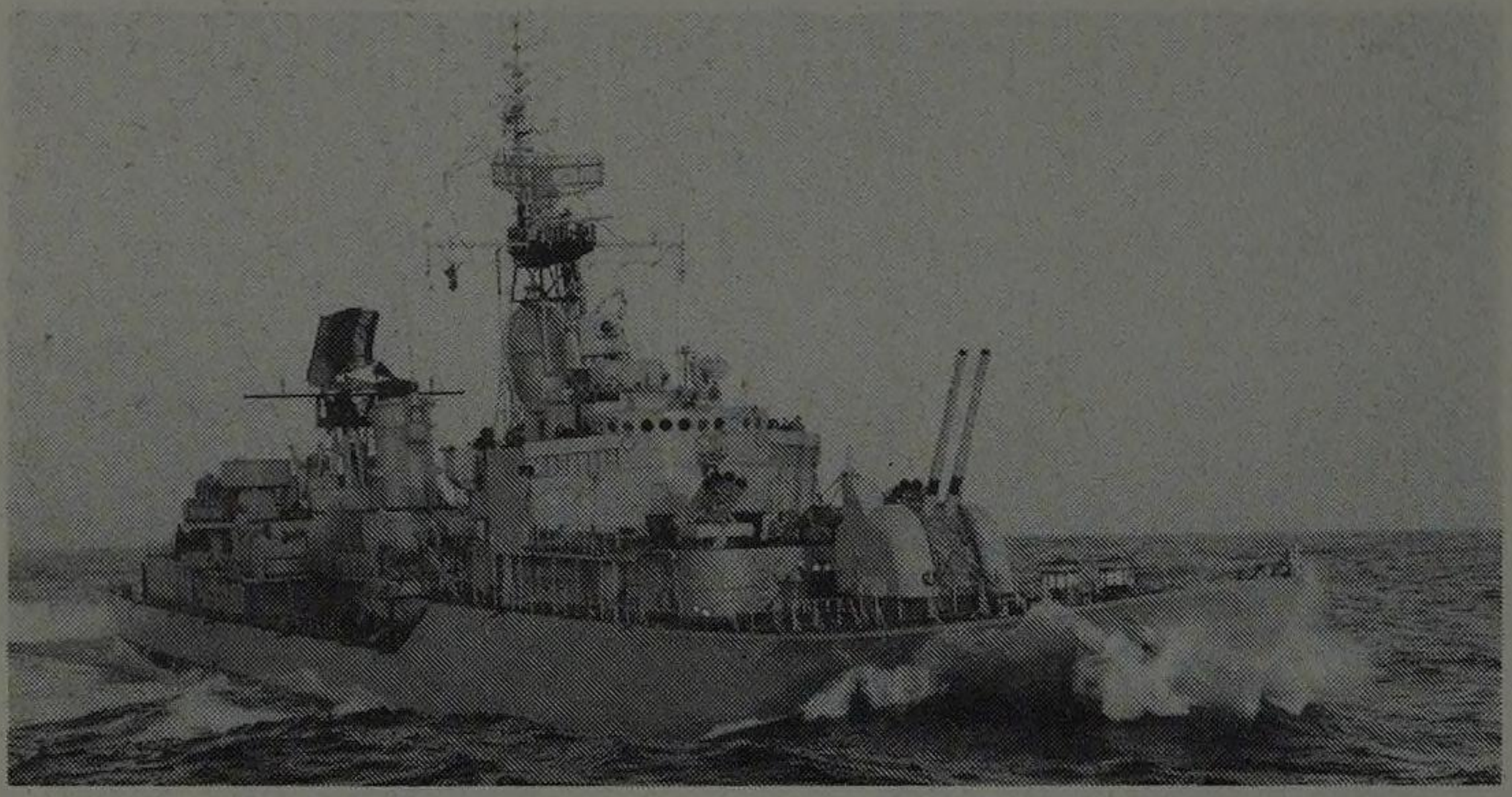


Almirante Riveros (D18) at speed.

Role: General-purpose. **Builder**: Vickers, UK.
User: Chilean Navy.
Basic data: 3,300 t full displacement; 402 ft (122.5 m) overall length; 43 ft (13.1 m) maximum beam. **Crew**: 266.
Propulsion: 2 Parsons-Paramtreda geared steam turbines (50,000 shp); 2 propellers.
Sensors: 1 Plessey AWS-1 long-range air search radar; 1 SGR 102 height finder (3-D) radar; 1 Marconi surface search and nav radar; 2 Hollandse M-4 missile fire control radars; 1 Type 164B hull-mounted sonar.
Armament: 2 twin Exocet anti-ship missile launchers; 4 single 4 inch dual-purpose guns; 2 quadruple Seacat point air defence missile launchers; 4 single Bofors 40 mm anti-aircraft guns; 2 triple lightweight anti-submarine torpedo tubes; 2 Squid anti-submarine mortars.
Top speed: 34.5 kt. **Range**: 7,800 nautical miles at 18 kt.
Programme: This 2 ship class comprises *Almirante Riveros* (D18) and *Almirante Williams* (D19). Laid down by Vickers at Barrow-in-Furness between June 1956 and April 1957, the ships joined the Chilean Navy in December 1960 and March 1960, respectively.
Notes: Designed very much in the mould established by the British destroyers of World War II, the Almirante Williams class carry a respectable anti-ship capability. Both ships were refitted by Vickers during the first half of the 1970s.

Friesland class

Destroyers

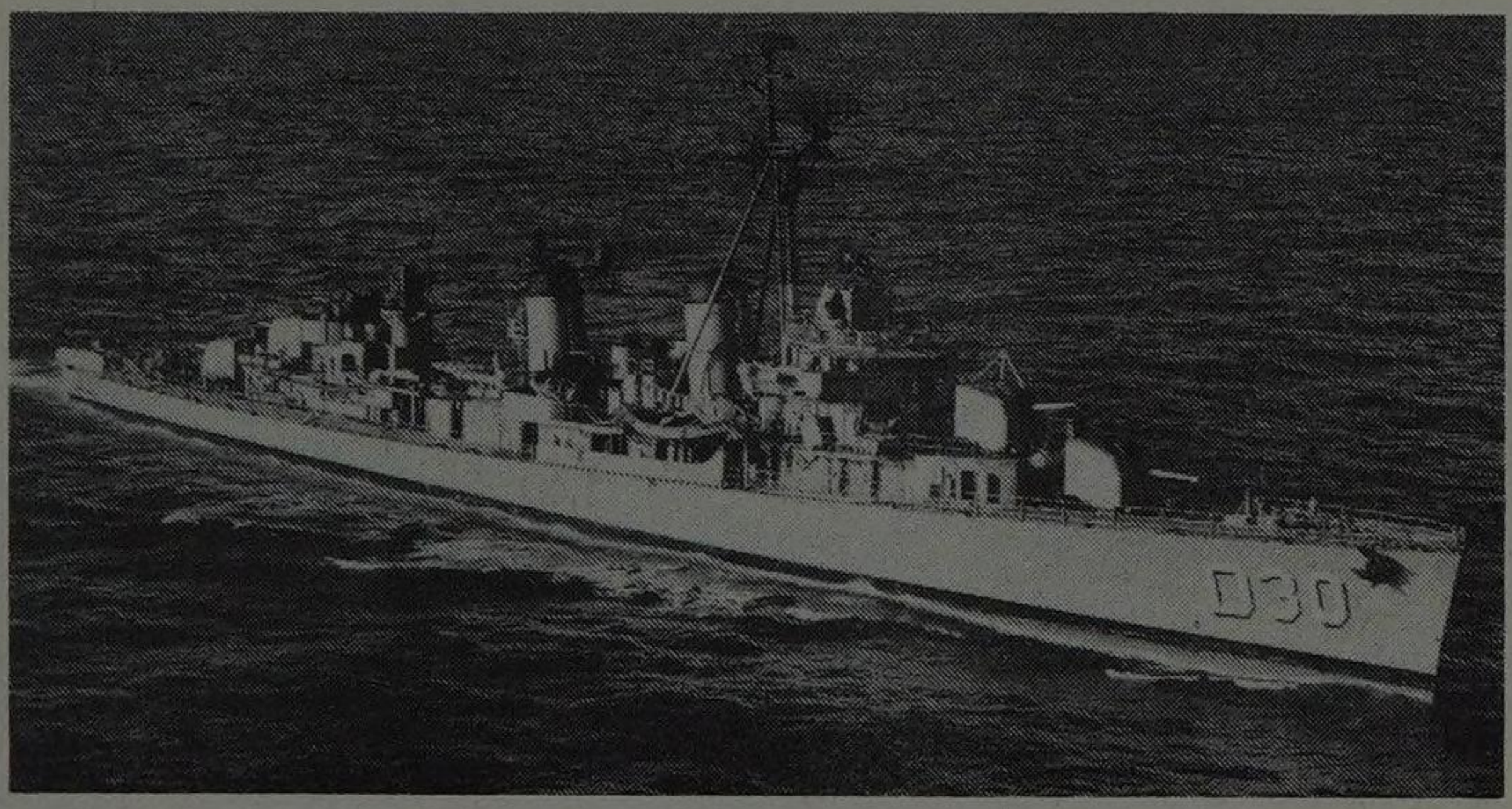


A Friesland class destroyer slicing through the North Sea.

Role: General-purpose. **Builders**: Various, Netherlands.
User: Royal Netherlands Navy, Peruvian Navy.
Basic data: 3,100 t full displacement; 380.6 ft (116 m) overall length; 38.6 ft (11.8 m) maximum beam. **Crew**: 280.
Propulsion: 2 Parsons geared steam turbines (total 60,000 shp); 2 propellers.
Sensors: 1 Hollandse LWO 2 long-range air search radar; 1 Decca 1229 nav radar; 1 Hollandse DA 05 low-level air and sea search radar; 1 Hollandse M 45 fire control radar; 1 Hollandse CWE 610 hull-mounted sonar.
Armament: 2 twin 120 mm dual-purpose guns; 4 single 40 mm Bofors anti-aircraft guns; 2 quadruple Bofors 375 mm anti-submarine mortars; 1 depth charge rack.
Top speed: 36 kt. **Range**: 4,000 nautical miles at 18 kt.
Programme: This 8 ship class comprises: HNLMS *Friesland* (D812), HNLMS *Groningen* (D813), HNLMS *Limburg* (D814), HNLMS *Overijssel* (D815), HNLMS *Drenthe* (D816), HNLMS *Utrecht* (D817), HNLMS *Rotterdam* (D818) and HNLMS *Amsterdam* (D819). While now being phased out of service as replacement Kortenaer class ships are delivered, 1 of the Friesland class could remain in service during the first half of the 1980s for use on North Sea patrol.
Notes: Commissioned between 1956 and 1958, these robustly-built 2 funnelled destroyers are still useful workhorses and all but D815 have been sold to Peru.

Fletcher class

Destroyers

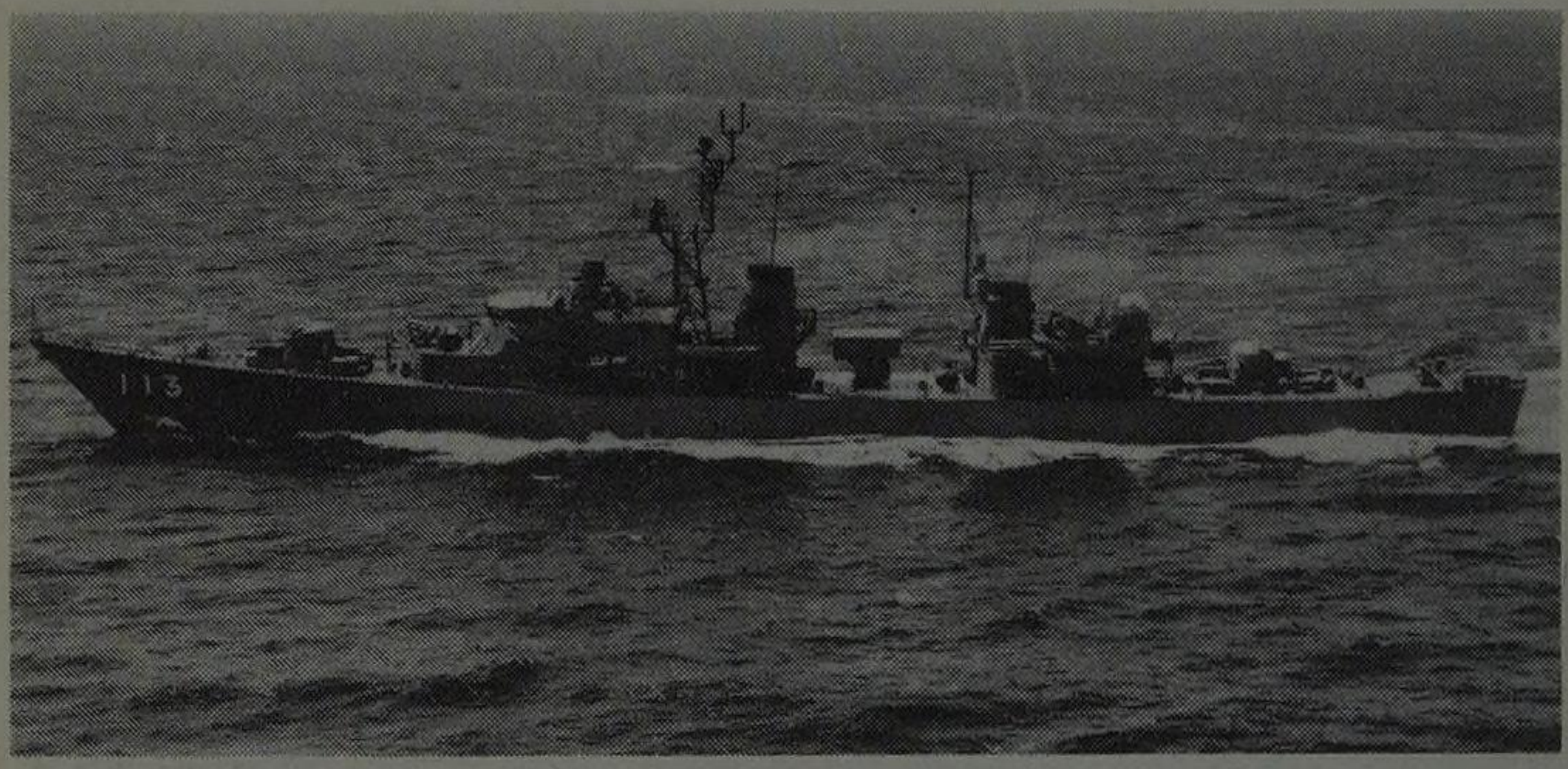


The Brazilian Navy's *Pernambuco* (D30).

Role: General-purpose. **Builders**: Various, USA.
Users: Navies of Argentina, Brazil, Chile, Greece, Mexico, Peru, South Korea, Spain, Taiwan and Turkey.
Basic data: 2,850 t full displacement; 376.8 ft (114.85 m) overall length; 39.5 ft (12.0 m) maximum beam.
Crew: around 265.
Propulsion: 2 geared steam turbines (total 60,000 shp); 2 propellers.
Sensors: All ships carry 1 SPS-6 air search radar and 1 SPS-10 surface search radar. All ships fitted with sonar, mainly SQS-4 or -29. Various fire control radars equip the ships of Brazil, Greece, Spain, Taiwan and Turkey.
Armament: Original fit comprised: 5 single 5 inch guns; 6 or 10 single 40 mm anti-aircraft guns; 10 heavyweight torpedo tubes and depth charges. Some ships still carry the full primary gun complement, but most now only carry 4. Similarly, only the navies of Brazil, South Korea and Spain retain the 40 mm guns, the rest having switched to 6 single 76 mm guns. Anti-submarine torpedoes are still carried, but current installations consist of either 5 heavyweight or 6 lightweight torpedo tubes. All ships still mount a Hedgehog depth charge mortar.
Top speed: 32–36 kt. **Range**: 5,000 nautical miles at 15 kt.
Programme: In all, 180 Fletcher class destroyers were built in numerous US shipyards between 1942 and 1944.
Notes: Over 40 of these elderly ships still serve in mid-1982.

Yamagumo class

Destroyers



Yamagumo (D113) exhibits its very clean lines.

Role: Anti-submarine. **Builders**: Various, Japan.
User: Japanese Maritime Self-Defence Force.
Basic data: 2,700 t full displacement; 377 ft (114.9 m) overall length; 38.7 ft (11.8 m) maximum beam. **Crew**: 237.
Propulsion: 6 Mitsubishi 12UEV diesels (total 26,500 bhp); 2 propellers.
Sensors: 1 OPS-11 air search radar; 1 OPS-17 surface search radar; 2 GFCS 2 gun fire control radars; 1 SQS-23 hull-mounted sonar; 1 SQS-35J variable depth sonar.
Armament: 2 twin 76 mm dual-purpose guns; 1 octuple ASROC anti-submarine missile launcher; 1 quadruple 375 mm Bofors anti-submarine rocket launcher; 2 triple lightweight anti-submarine torpedo tubes.
Top speed: 27 kt. **Range**: 7,000 nautical miles at 20 kt.
Programme: This 6 ship class comprises: *Yamagumo* (D113), *Makigumo* (D114), *Asagumo* (D115), *Aokumo* (D119), *Akigumo* (D120) and *Yugumo* (D121). Constructed in 4 separate shipyards, the class was laid down between March 1964 and February 1976, the ships entering service between January 1966 and March 1978. The ships are scheduled to undergo major refits during the earlier part of the 1980s.
Notes: Based on the Minegumo class destroyers, the Yamagumo class, as with other Japanese surface combatants, carry a very heavy anti-submarine armament at the expense of anti-air capability. The class carries no facilities for helicopter operation.

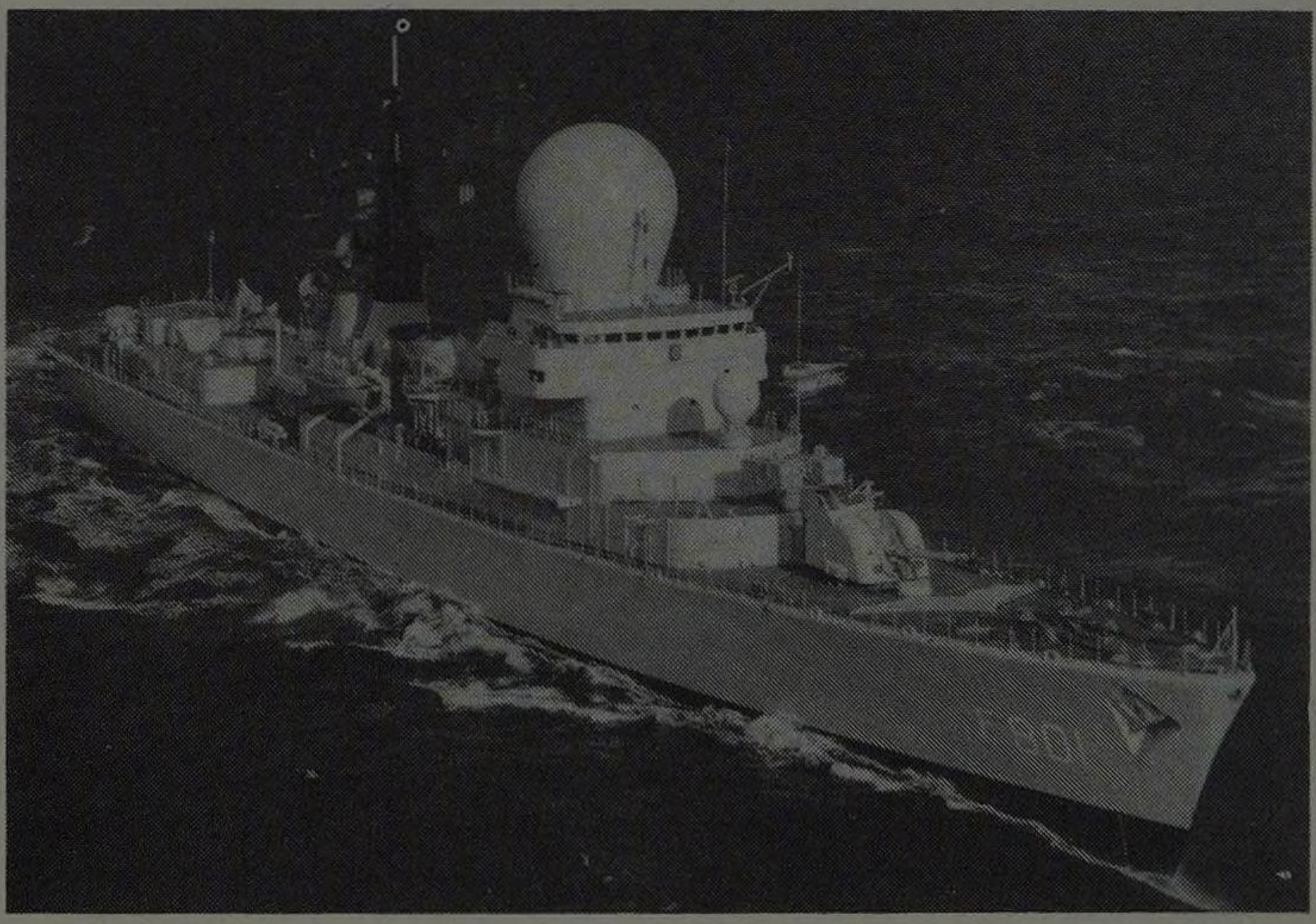
Murasame class

Destroyers

Murasame (D107), the Mitsubishi-built lead of class.

Role: Anti-submarine. **Builders**: Various, Japan.
User: Japanese Maritime Self-Defence Force.
Basic data: 2,400 t full displacement; 360 ft (109.7 m) overall length; 36 ft (11 m) maximum beam. **Crew**: 250.
Propulsion: 2 geared steam turbines (total 35,00 shp); 2 propellers.
Sensors: 1 OPS-15 long-range air search radar; 1 OPS-1 surface search radar; 3 Mk 34 gun fire control radars; 1 OQA-1 variable depth sonar.
Armament: 3 single 5 inch Mk 39 dual-purpose guns; 2 twin 76 mm dual-purpose guns; 1 Mk 15 Hedgehog anti-submarine mortar; 2 triple lightweight anti-submarine torpedo tubes.
Top speed: 30 kt. **Range**: 6,000 nautical miles at 18 kt.
Programme: This 3 ship class comprises *Murasame* (D107), *Yudachi* (D108) and *Harusame* (D109); all laid down between December 1957 and June 1958. Respective commissioning dates for the 3 ships were February 1959, March 1959 and December 1959.
Notes: Similar in hull form and machinery layout to the smaller Ayanami class destroyers, the Murasame class must now be considered obsolescent, particularly, in the context of modern air and surface threats. The primary 5 inch gun armanent fitted to this class were removed from the US Navy's Midway class aircraft carriers.

Tromp class

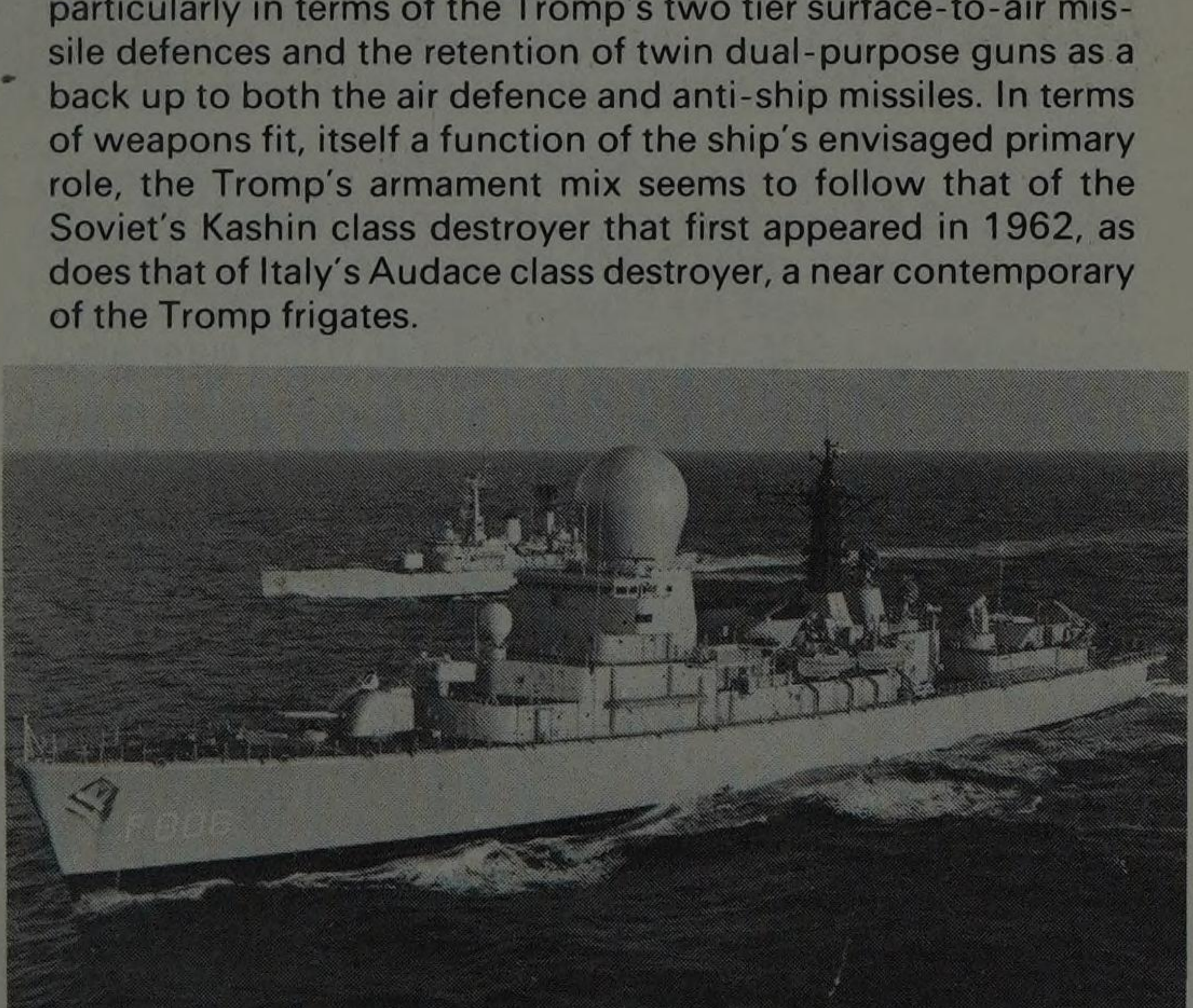


HNLMS *Tromp* (F801), 1977.

Role: General-purpose. **Builder**: De Schelde, Netherlands.
User: Royal Netherlands Navy.
Basic data: 4,308 t full displacement; 452.75 ft (138 m) overall length; 48.9 ft (14.9 m) maximum beam. **Crew**: 306.
Propulsion: 2 Rolls-Royce TM3B Olympus gas turbines (de-rated to total 44,000 shp) or 2 Rolls-Royce Tyne RM1C gas turbine (total 8,200 shp); COGOG; 2 c-p propellers.
Sensors: 1 Hollandse SPS-01 long-range, 3-D, air search radar: 1 Hollanse ZW05 surface search and nav radar; 1 Hollandse WM25 fire control radar; 2 Hollandse SPG-51C fire control radar; 1 Hollandse CWE 610 hull-mounted sonar; Hollandse SEWACO automated data processing system.
Armament: 1 Westland Lynx helicopter; 2 quadruple Harpoon anti-ship missile launchers; 1 Tartar area air defence launcher system with 40 missiles; 1 octuple Sea Sparrow short-range air defence missile launcher; 2 Bofors 120 mm guns; 2 triple anti-submarine lightweight torpedo tubes.
Top speed: 28 kt. **Range**: 5,000 nautical miles at 18 kt.
Programme: This 2 ship class comprises HNLMS *Tromp* (F801) and HNLMS *De Ruyter* (F806), laid down in August

and December 1971, respectively. *Tromp* was launched in June 1973 and entered service in October 1975, while *De Ruyter* was launched in March 1974 and joined the fleet in June 1976.

Notes: These two large frigates exemplify the enormous strides made in shipborne armaments brought about by the introduction of the guided missile, illustrated by the fact that these ships pack considerably more firepower with greater strike range than that carried aboard the two nearly 12,000 ton cruisers that they replaced. Characterised by the massive bulbous radome that covers the ship's powerful 3-D surveillance radar, the two Tromp class frigates serve as the flagships of the Royal Netherlands Navy, being used as the respective leaders of the two Netherlands Navy long-range, deep water task groups. Comparable in size to the Royal Navy's Sheffield class destroyers and the Broadsword class frigates, the Tromps carry a more balanced armament than either of their British counterparts, particularly in terms of the Tromp's two tier surface-to-air missile defences and the retention of twin dual-purpose guns as a back up to both the air defence and anti-ship missiles. In terms of weapons fit, itself a function of the ship's envisaged primary role, the Tromp's armament mix seems to follow that of the Soviet's Kashin class destroyer that first appeared in 1962, as does that of Italy's Audace class destroyer, a near contemporary of the Tromp frigates.



HNLMS *De Ruyter* (F806) with Van Speijk class frigate, 1978.

Knox class

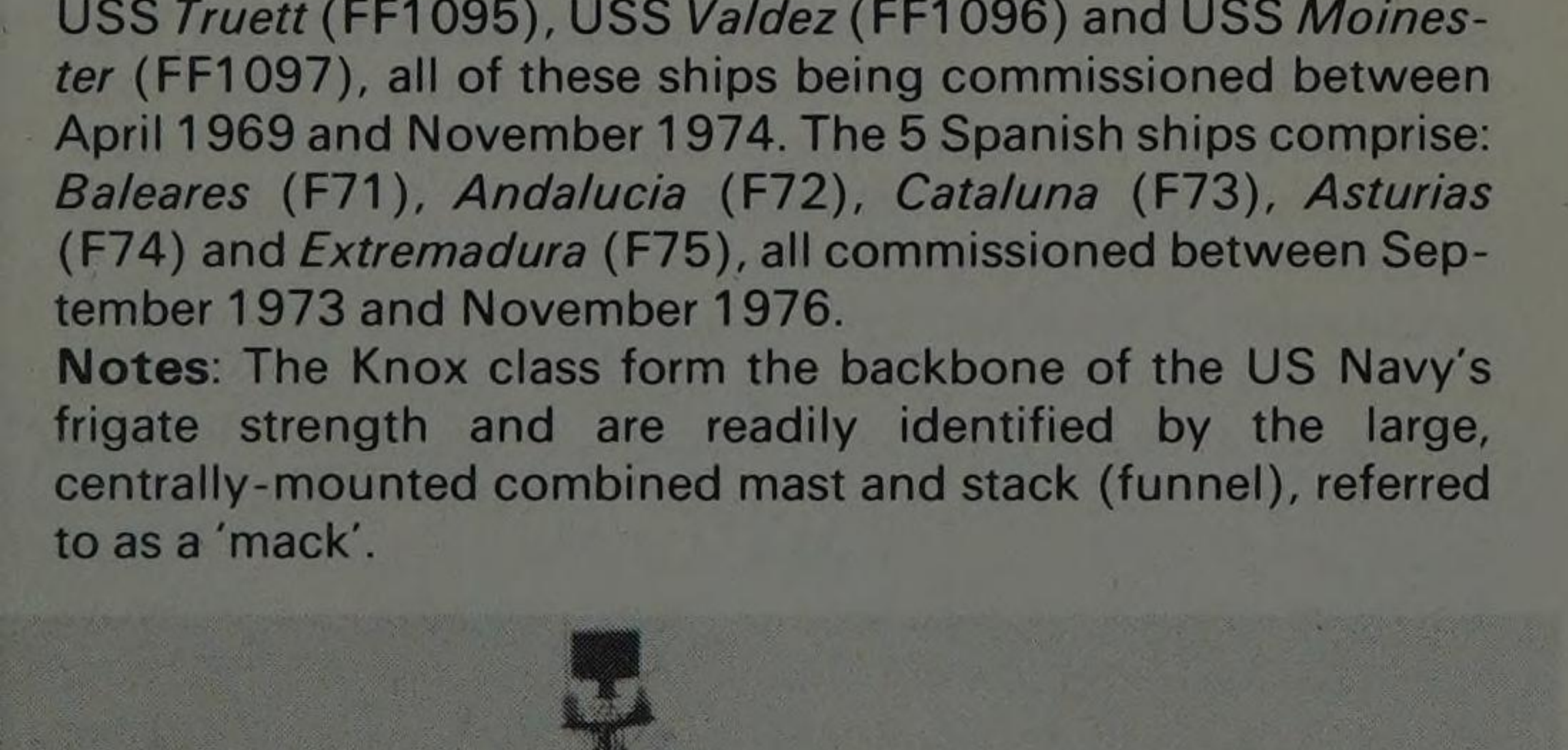
Frigates

USS *Blakely* (FF1072) operating with the US Atlantic Fleet.

Role: General-purpose.
Builders: Various, USA & Bazan, Spain.
Users: US and Spanish Navies.
Basic data: 4,100 t full displacement; 438 ft (133.8 m) overall length; 46.75 ft (14.25 m) maximum beam. **Crew**: 266.
Propulsion: 1 Westinghouse geared steam turbine (35,000 shp); 1 propeller.
Sensors: 1 SPS-40 air search radar; 1 SPS-10 surface search radar; 1 SPS-58 low-level air threat warning radar; 1 Mk 115 missile fire control radar; 1 Mk 68 gun fire control radar; 1 SPG-53 surface target fire control radar; 1 SQS-26CX bow-mounted sonar; 1 SQS-18 towed array sonar; NTDS automated action information data processing.
Armament: 1 Kaman SH-2 Seasprite (US) or Hughes 500 (Spanish) helicopter; 1 octuple Mk 25 launcher for Sea Sparrow point air defence missiles in US ships or 1 single Mk 22 launcher for Standard MR area air defence missiles on Spanish ships; 1 octuple Mk 16 launcher for ASROC anti-submarine missiles or Harpoon anti-ship missiles; 1 single 5 inch Mk 42 dual-purpose gun; 4 lightweight anti-submarine torpedo tubes.
Top speed: 28 kt. **Range**: 4,500 nautical miles at 20 kt.
Programme: The first of the US Navy's 46 Knox class vessels was laid down in October 1965 and the first of Spain's 5 Baleares class ships in October 1968. Builders involved in the US programme were Todd Shipyards, Lockheed and Avondale Shipyards (the latter building most), while all 5 Spanish frigates were built in Bazan's el Ferrol yards. The US class comprises: USS *Knox* (FF1052), USS *Roark* (FF1053), USS *Gray*

(FF1054), USS *Hepburn* (FF1055), USS *Connole* (FF1056), USS *Rathburne* (FF1057), USS *Meyerkord* (FF1058), USS *W. S. Sims* (FF1059), USS *Lang* (FF1060), USS *Patterson* (FF1061), USS *Whipple* (FF1062), USS *Reasoner* (FF1063), USS *Lockwood* (FF1064), USS *Stein* (FF1065), USS *Marvin Shields* (FF1066), USS *Francis Hammond* (FF1067), USS *Vreeland* (FF1068), USS *Bagley* (FF1069), USS *Downes* (FF1070), USS *Badger* (FF1071), USS *Blakely* (FF1072), USS *Robert E. Peary* (FF1073), USS *Harold E. Holt* (FF1074), USS *Trippe* (FF1075), USS *Fanning* (FF1076), USS *Quellet* (FF1077), USS *Joseph Hewes* (FF1078), USS *Bowen* (FF1079), USS *Paul* (FF1080), USS *Aylwin* (FF1081), USS *Elmer Montgomery* (FF1082), USS *Cook* (FF1083), USS *McCandless* (FF1084), USS *Donald B. Beary* (FF1085), USS *Brewton* (FF1086), USS *Kirk* (FF1087), USS *Barbey* (FF1088), USS *Jesse L. Brown* (FF1089), USS *Ainsworth* (FF1090), USS *Miller* (FF1091), USS *Thomas C. Hart* (FF1092), USS *Capodanno* (FF1093), USS *Pharris* (FF1094), USS *Truett* (FF1095), USS *Valdez* (FF1096) and USS *Moinester* (FF1097), all of these ships being commissioned between April 1969 and November 1974. The 5 Spanish ships comprise: *Baleares* (F71), *Andalucia* (F72), *Cataluna* (F73), *Asturias* (F74) and *Extremadura* (F75), all commissioned between September 1973 and November 1976.

Notes: The Knox class form the backbone of the US Navy's frigate strength and are readily identified by the large, centrally-mounted combined mast and stack (funnel), referred to as a 'mack'.



Note the *Baleares'* (F71) aft -mounted Standard missile launcher.

Broadsword class

Frigates

HMS *Broadsword* (F88) on sea trials, early 1979.

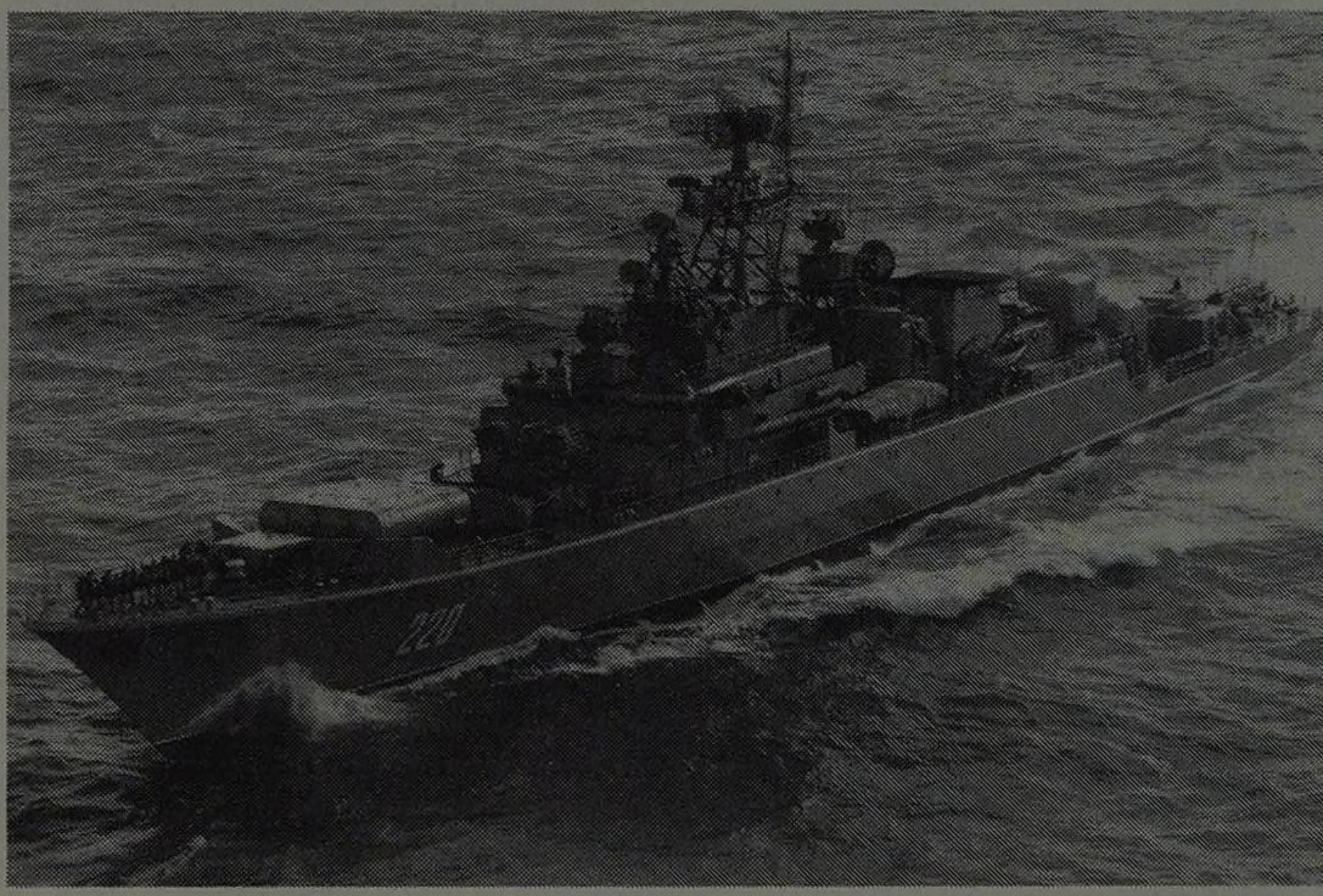
Role: Anti-submarine. **Builders:** Yarrow & Swan Hunter, UK.
User: Royal Navy.
Basic data: 4,000 t full displacement; 430 ft (131 m) overall length; 48.5 ft (14.75 m) maximum beam. **Crew**: 248.
Propulsion: 2 Rolls-Royce TM3B Olympus gas turbines (total 56,000 shp) or 2 Rolls-Royce RM1A Tyne gas turbines (total 8,500 shp); COGOG; 2 c-p propellers.
Sensors: 1 Marconi Type 968 air search radar; Marconi Type 967 (back-to-back) surface search radar; 1 Kelvin Hughes Type 1006 nav radar; 2 Marconi Type 910 Seawolf fire control radars; 1 Plessey Type 2016 hull-mounted sonar; Ferranti CAAIS automated action data processing system.
Armament: 2 Westland Lynx helicopters, 2 twin Exocet anti-ship missile launchers; 2 sextuple Seawolf close-in air defence missile launchers; 2 Bofors 40 mm anti-aircraft guns; 2 Plessey STWS triple lightweight anti-submarine torpedo tubes.
Top speed: 30 kt. **Range**: 4,500 nautical miles at 19 kt.
Programme: Currently a total of 12 are on order, with Yarrow acting as lead yard for the Type 22 family. Orders for the first batch of 4 ships, HMS *Broadsword* (F88), HMS *Battleaxe* (F89), HMS *Brilliant* (F90) and HMS *Brazen* (F91), followed at intervals of roughly a year between February 1974 and October 1977, these ships being accepted in February 1979, December 1979, April 1981 and September 1982, respectively. A second 6 ship batch order, this time for Stretched Type 22s, started in April 1979, with Yarrow building HMS *Boxer* (F92) and HMS *Beaver* (F93), along with 2 more, while Swan Hunter were to build the last 2. An order for 2 Improved Batch III ships was placed with Yarrow in December 1982. Tentative acceptance dates for the Batch 2 and 3 ships commence in December

1983 and extend into the late 1988 period.

Notes: The Type 22 Broadswords are the first Royal Navy ships to be built to metric measurements and are also the first not to embody any primary gun armament from design inception. Probably the most expensive and complex part solution to the anti-submarine problem yet devised, the Broadswords were designed as a major element of an all-weather anti-submarine task group using air, surface and sub-surface units in the hostile waters of the Greenland/Faroes Gap. Indeed, even in the latter 1970s, there were powerful critics within the Royal Navy who were arguing that there really was no future for the frigate, especially ones as expensive as the Broadswords. Ironically, as the Falklands conflict was to highlight dramatically, HMS *Broadsword* and HMS *Brilliant* were to play a vital role, albeit in the context of employing their highly effective radar-guided Seawolf point air defence missile systems. Little details have yet been revealed concerning the stretched Batch 2 ships, other than that their length has been increased to 479.5 ft (146.2 m) by an insertion amidships.

HMS *Brilliant* (F90), early 1981; note smaller funnel.

Krivak I/II classes



A Krivak I in the English Channel, April 1976.

Role: Anti-submarine.
Builders: Zhdanov, Kaliningrad, etc., USSR.
User: Soviet Navy.
Basic data: c. 4,000 t full displacement; 410 ft (125 m) overall length; 47 ft (14.3 m) maximum beam. **Crew**: 200.
Propulsion: Gas turbines (total 50,000 shp); 2 propellers.
Sensors: 1 long-range air search radar; 1 nav radar; 5 fire control radars; 1 hull-mounted sonar; 1 towed variable depth sonar.
Armament: 4 SS-N-14 anti-submarine missile launchers; 2 twin SA-N-4 surface-to-air missile launchers; 2 twin 76 mm anti-aircraft guns in Krivak Is, or 2 single 100 mm dual-purpose guns in Krivak IIs; 2 anti-submarine rocket launchers; 2 quadruple 21 inch anti-submarine torpedo tubes; mines.
Top speed: 31 kt. **Range**: 700 nautical miles at 30 kt.
Programme: The first Krivak class frigate put to sea during 1970 and construction of the class continues, with a known 28 ships having entered Soviet service by the end of 1980. At least 5 Soviet shipyards were reported to have been involved in the construction of the known 17 ship Krivak I programme, with Kaliningrad delivering the first of the Krivak IIs in 1976. The

differences between the Krivak Is and IIs lie in the substitution of heavier calibre guns in the aft turrets of the Krivak IIs, along with the incorporation of an improved variable depth sonar.

Notes: The Krivak class frigates exemplify the Soviet Navy's philosophy of packing as much weaponry into their vessels as possible. Indeed, even despite the Krivak class's lack of a helicopter, the class still carries more anti-submarine weaponry than any other ship of comparable size, such as the Royal Navy's Broadsword class. In comparison with the contemporary Kresta II cruiser, it is interesting to note that the Krivaks mount identical primary armament and only fall short in terms of lacking an area air defence missile system of the larger Soviet ship. Along with the Kresta IIs, the emergence of the Krivak class frigates marked a major shift in Soviet naval mission emphasis, in which the role of the ships was clearly dedicated towards killing submarines, unlike the previous practice of equipping vessels with the kind of cruise missiles best suited to conducting long-range engagements against carrier-centred task groups. The SS-N-14 'Silex' anti-submarine missiles that form the Krivak class's primary armament are reported to have a maximum effective range of around 25 nautical miles, which they cover at a high subsonic speed of around Mach 0.95, or around 645 mph.

Krivak II *Razitel'nyj,* October 1979

Bremen class

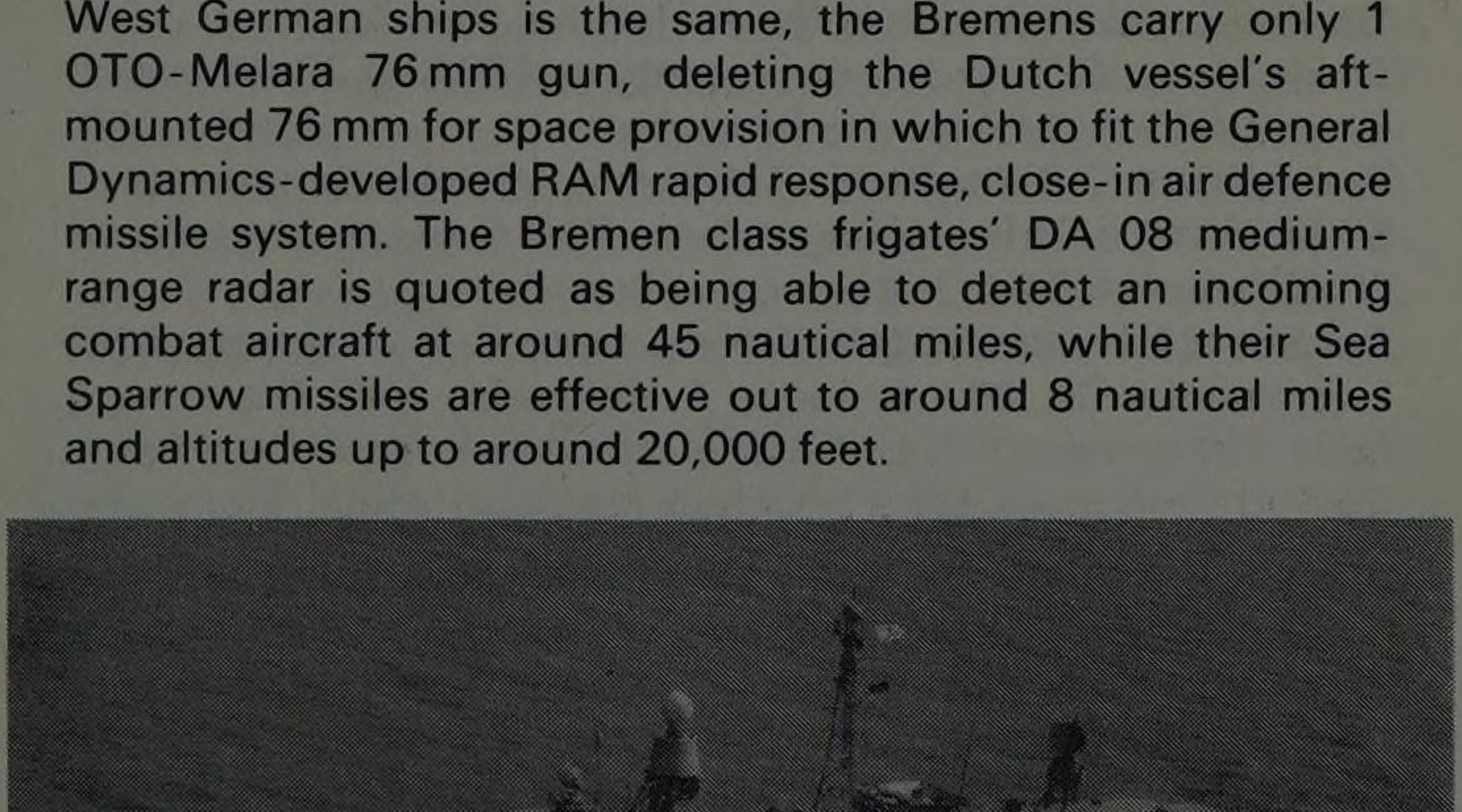
Frigates

Bremen (F207) in initial sea trials, May 1981.

Role: General-purpose. **Builders**: Various, Federal Germany.
User: Federal German Navy.
Basic data: 3,800 t full displacement; 426.5 ft (130 m) overall length; 47.25 ft (14.4 m) maximum beam. **Crew**: 200.
Propulsion: 2 General Electric LM2500 gas turbines (total 50,000 shp) or 2 MTU Type 20V 956 TB 92 diesels (total 10,400 bhp); CODOG; 2 c-p propellers.
Sensors: 1 Hollandse DA 08 air and sea search radar; 1 SMA 3 RM 20 nav radar; 1 Hollandse WM25 and 1 Hollandse STIR fire control radars; 1 Krupp Atlas DSQS-21BZ hull-mounted sonar; SATIR automated action information data processing.
Armament: 2 Westland Lynx helicopters; 2 quadruple Harpoon long-range anti-ship missile launchers; 1 OTO-Melara 76 mm dual-purpose gun; 1 octuple Sea Sparrow point air defence missile launcher; 2 twin lightweight anti-submarine torpedo tubes; provision for 2 24-cell RAM close-in air defence missile launchers.
Top speed: 30 kt. **Range**: 4,000 nautical miles at 18 kt.
Programme: The first 6 of what was to be a 12 ship class were ordered in July 1977. The 9th through 12th ships were cancelled in mid-1980, while the fate of the 7th and 8th vessels remains uncertain. The 6 frigates currently being completed are *Bremen* (F207), *Niedersachen* (F208), *Rheinland-Pfalz*

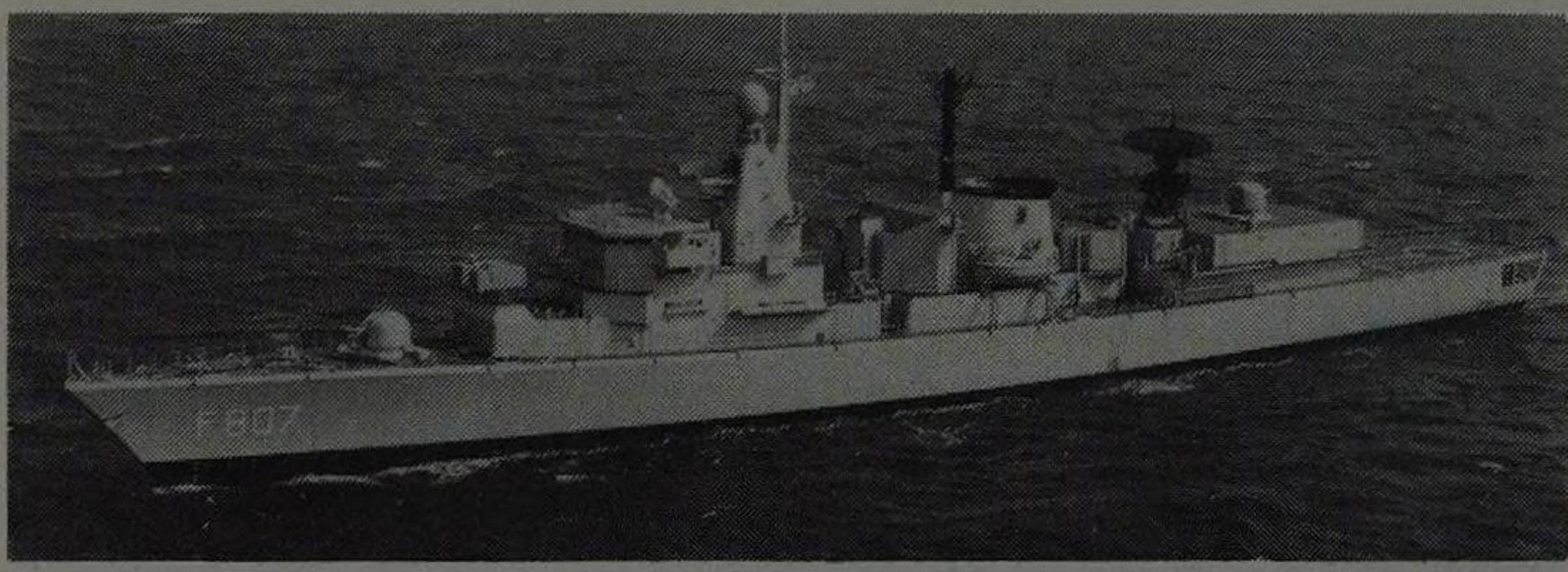
(F209), *Emden* (F210), *Koln* (F211) and *Karlsruhe* (F212). The construction programme has been spread widely around the WestGerman naval shipbuilders, with Bremer Vulkan acting as lead yard and responsible for the building of F207. Blohm und Voss built F209 and F211, AG Weser built F208, Thyssen Nordseewerke built F210 and Howaldtswerke-Deutsche Werft built F212. All 6 frigates so far laid down were launched between September 1979 and January 1982, at which time *Bremen* (F207) was already on sea trials.

Notes: Conceived as replacement for the existing Type 120 or Koln class frigates, the Type 122 or Bremen class design is based on the Dutch-developed Standard or Kortenaer class hull, but breaks with the Dutch design in adopting a combined diesel or gas turbine machinery solution. While the primary anti-ship and air defence missile complement of the Dutch and West German ships is the same, the Bremens carry only 1 OTO-Melara 76 mm gun, deleting the Dutch vessel's aft-mounted 76 mm for space provision in which to fit the General Dynamics-developed RAM rapid response, close-in air defence missile system. The Bremen class frigates' DA 08 medium-range radar is quoted as being able to detect an incoming combat aircraft at around 45 nautical miles, while their Sea Sparrow missiles are effective out to around 8 nautical miles and altitudes up to around 20,000 feet.



Bremen (F207) cruising under diesel power.

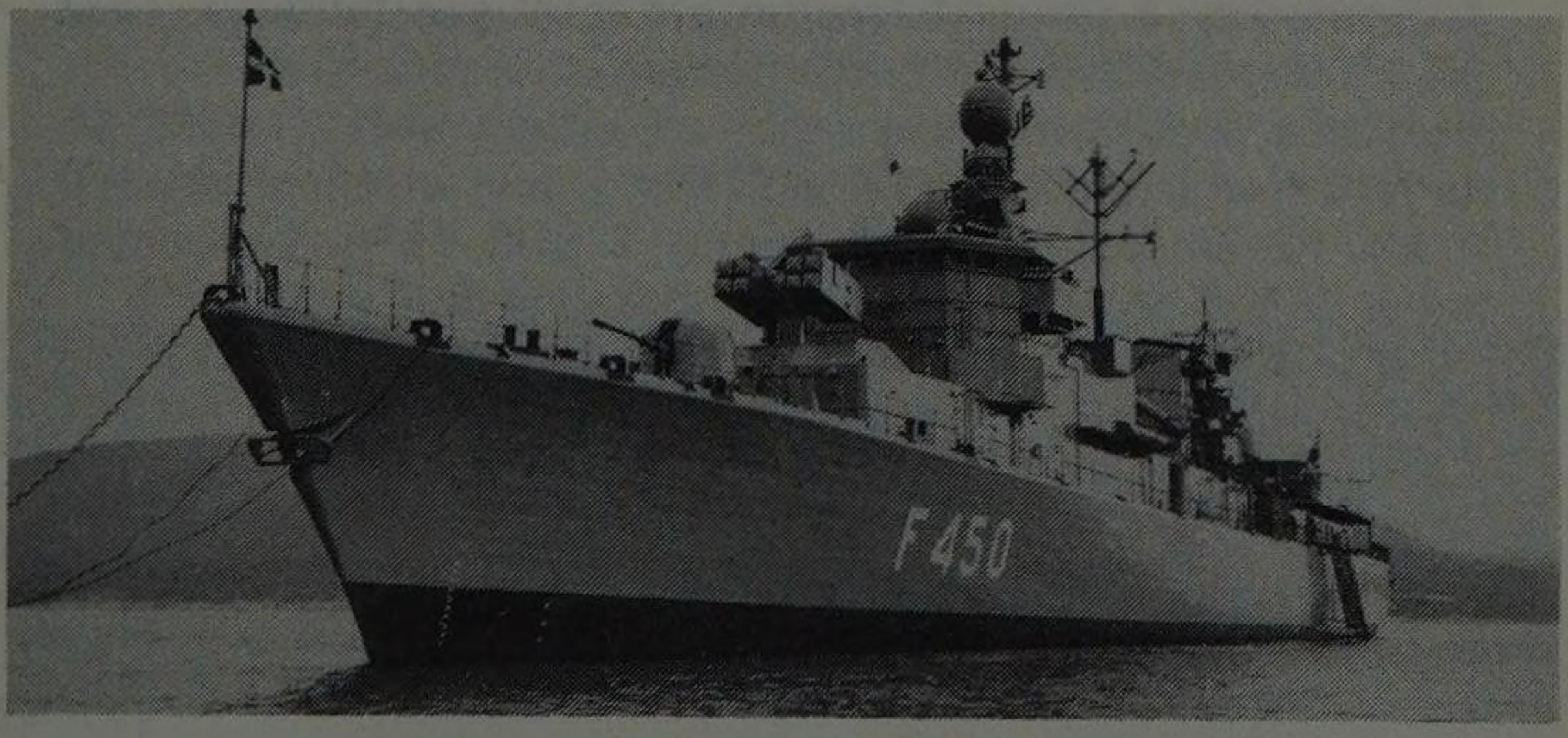
Kortenaer class



HNLMS *Kortenaer* (F807), 1978.

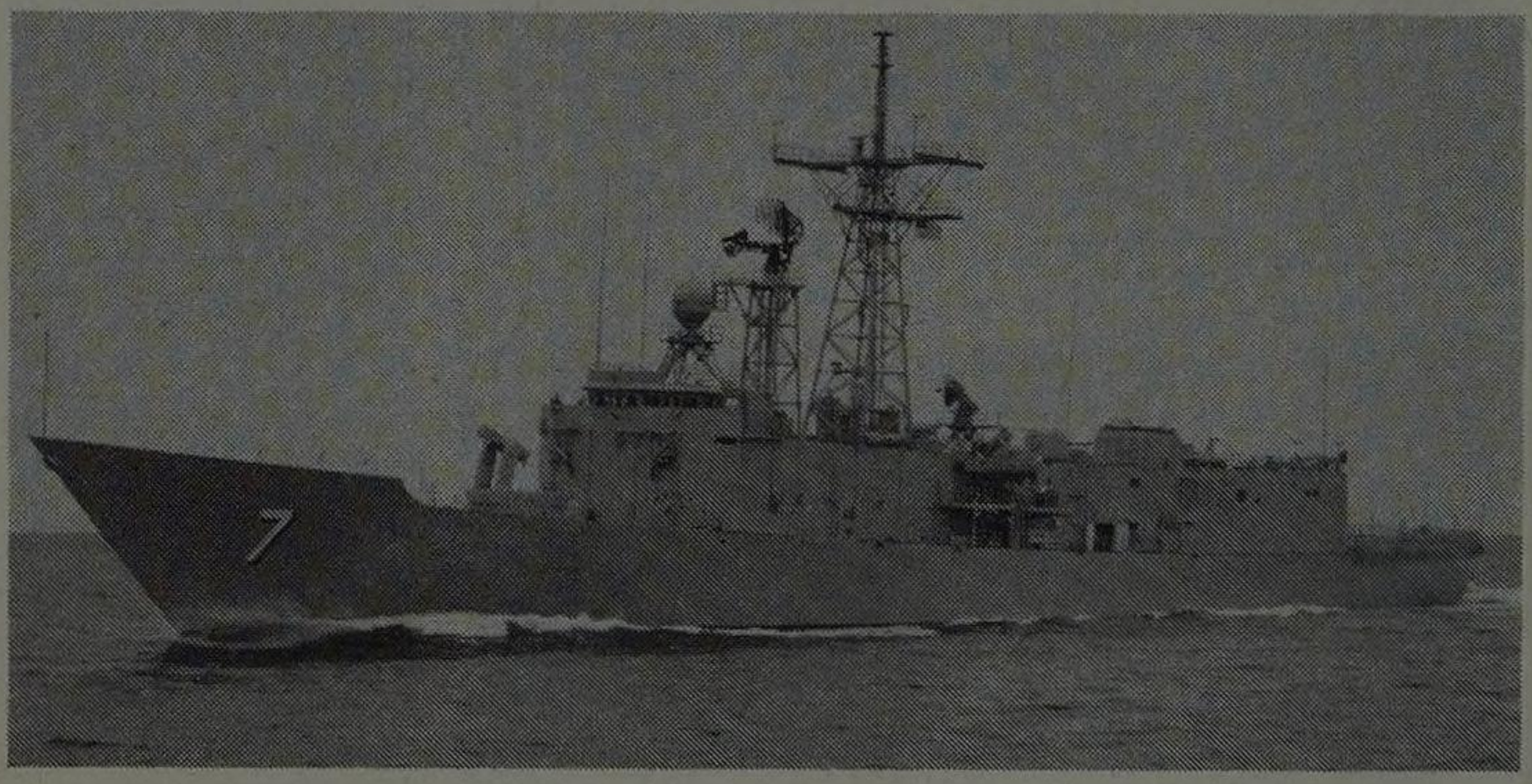
Role: Anti-submarine.
Builders: De Schelde & Wilton-Fijenoord (F823, F824 only), Netherlands.
Users: Royal Netherlands Navy, Hellenic (Greek) Navy.
Basic data: 3,750 t full displacement; 420 ft (128 m) overall length; 47.3 ft (14.4 m) maximum beam. **Crew**: 200.
Propulsion: 2 Rolls-Royce TM3B Olympus gas turbines (total 56,800 shp) or 2 Rolls-Royce Tyne RM1C gas turbines (total 10,800 shp); COGOG; 2 c-p propellers.
Sensors: 1 Hollandse LW 08 long-range 3-D air search radar; 1 Hollandse DA 05 nav radar; 1 Hollandse M45 fire control radar (76 mm gun); 1 Hollandse fire control radar (Sea Sparrow); 1 Hollandse SQS 505 hull-mounted sonar; Hollandse SEWACO automated action information data processor.
Armament: 2 Westland Lynx helicopters; 2 quadruple Harpoon anti-ship missile launchers; 1 octuple Sea Sparrow close-in air defence missile launcher; 2 OTO-Melara 76 mm dual-purpose guns; 2 twin lightweight anti-submarine torpedo tubes. F812 and F813 have 1 single Mk 13 Standard area defence missile launcher in place of a helicopter hangar.
Top speed: 30 kt. **Range**: 4,700 nautical miles at 16 kt.
Programme: Currently a 14 ship class, the original 12 Dutch vessels were ordered in 3 batches (4 each) between August 1974 and December 1976, the first keel being laid in April 1975. In September 1980, Greece placed an order for 1 of this class and took options to buy 2 more (1 to be built in Greece). The Greek need for early delivery led the Dutch to reallocate what should have been their 6th ship to Greece and the same procedure was followed with the planned 7th Dutch vessel, when

Greece took up its first option in July 1981. The Dutch ships, along with the year of their completion, are: *Kortenaer* (F807) 1978, *Callenburgh* (F808) 1979, *Van Kinsbergen* (F809) 1980, *Banckert* (F810) 1980, *Piet Heyn* (F811) 1981, *Abraham Crijnssen* (F816) 1982, *Philips van Almonde* (F823) 1981, *Bloys van Treslong* (F824) 1982, *Jan van Brakel* (F825) 1982 and *Willem van der Zaan* (F826) 1983. The 2 modified ships, *Pieter Florisz* (F812) 1984 and *Witte de With* (F813) 1985, are referred to as **Pieter Florisz** class frigates. The 2 Greek vessels so far ordered are *Elli* (F450) 1981 and *Lemnos* (F451) 1982.
Notes: The Kortenaer class display functional, relatively compact lines. In functional terms, the Kortenaers' primary role is the same as that of the Royal Navy's Broadswords, US Navy's Perry class and French Navy's Georges Leygues vessels. While of the four rival designs, the French vessel would appear to carry the most comprehensive anti-submarine package of sensors and weapons, the Kortenaers embody the most balanced sensor/weapons fit in terms of offensive and defensive armament. Under a collaborative agreement signed in 1975 between the West German and Dutch Governments, the hull and much of the Kortenaer's internal design layout has been adopted as the basis for West Germany's Type 122 Bremen class frigate.



The Greek Navy's *Elli* (F450), 1981.

Oliver Hazard Perry class Frigates

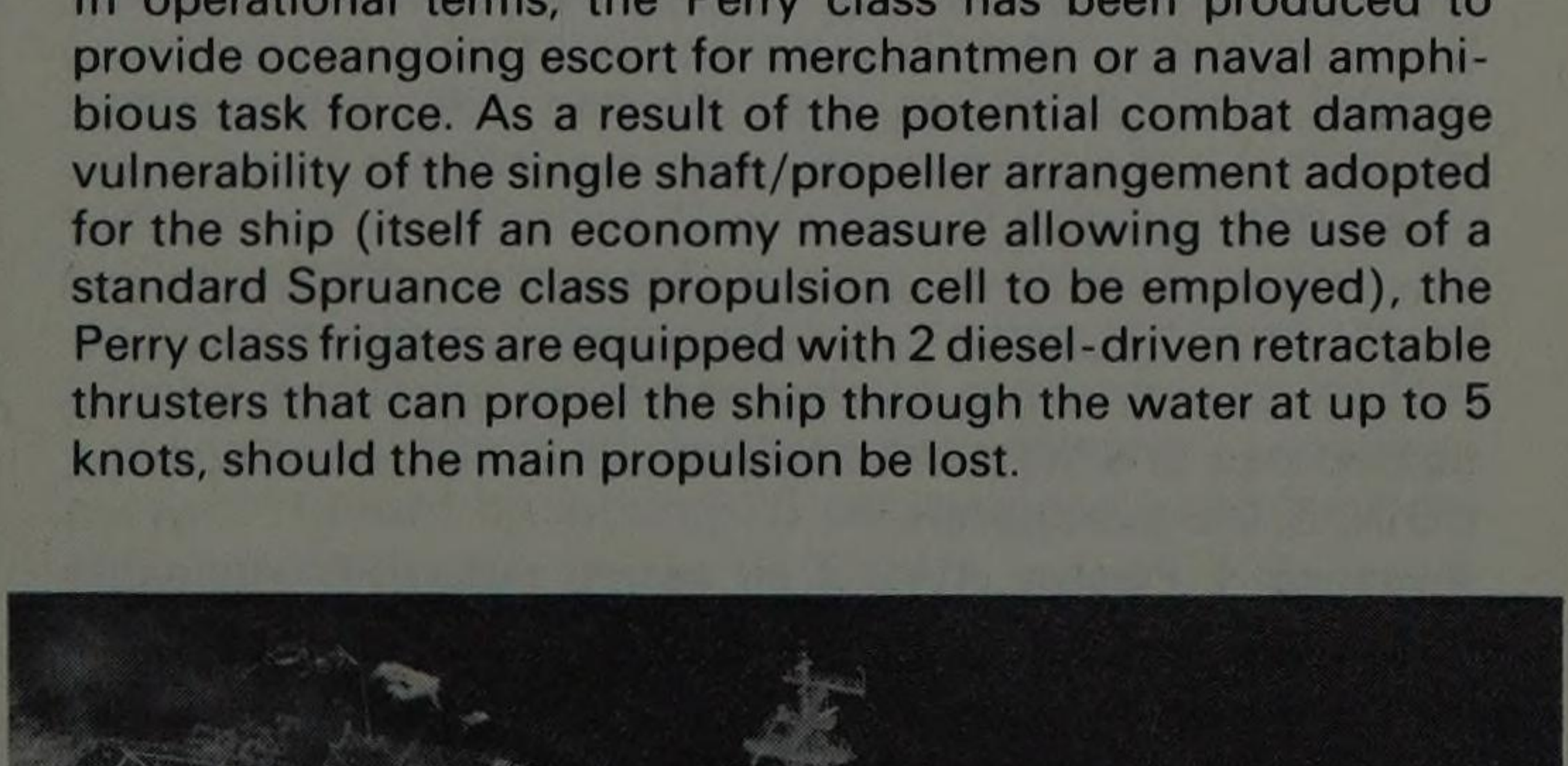


USS *Oliver Hazard Perry* (FFG7) with Mk 13 launcher forward.

Role: General-purpose.
Builders: Bath Iron Works & Todd Shipyards, USA; Bazan, Spain.
Users: Navies of the USA, Australia, Spain and Turkey.
Basic data: 3,700 t full displacement; 445 ft (135.6 m) overall length; 45 ft (13.7 m) maximum beam. **Crew**: 180.
Propulsion: 2 General Electric LM2500 gas turbines (total 40,000 shp); COGAG; 1 c-p propeller.
Sensors: 1 SPS-49 long-range air search radar; 1 SPS-55 surface search radar; 1 SPG-60 STIR fire control radar (missile); 1 Mk 92 fire control radar (gun); 1 SQS-56 hull-mounted sonar; NTDS automated action information data processing.
Armament: 2 up to Sikorsky SH-60 Seahawk sized helicopters; 1 single Mk 13 launcher for either Standard MR area air defence missiles or Harpoon anti-ship missiles; 1 single 76 mm Mk 75 anti-aircraft gun; 1 Phalanx 20 mm close-in weapons system; 2 triple lightweight anti-submarine torpedo tubes.
Top speed: 28 kt. **Range**: 4,000 nautical miles at 20 kt.
Programme: With design work on this class initiated in January 1971, an order for the lead ship, USS *Oliver Hazard Perry* (FFG7), was placed in October 1973. Laid down by the Bath Iron Works in June 1975, the *Perry* was launched in September 1976 and formally entered service in December 1977. From inception, construction of the class was split, roughly half-and-half, between the lead yard, East Coast-based Bath Iron

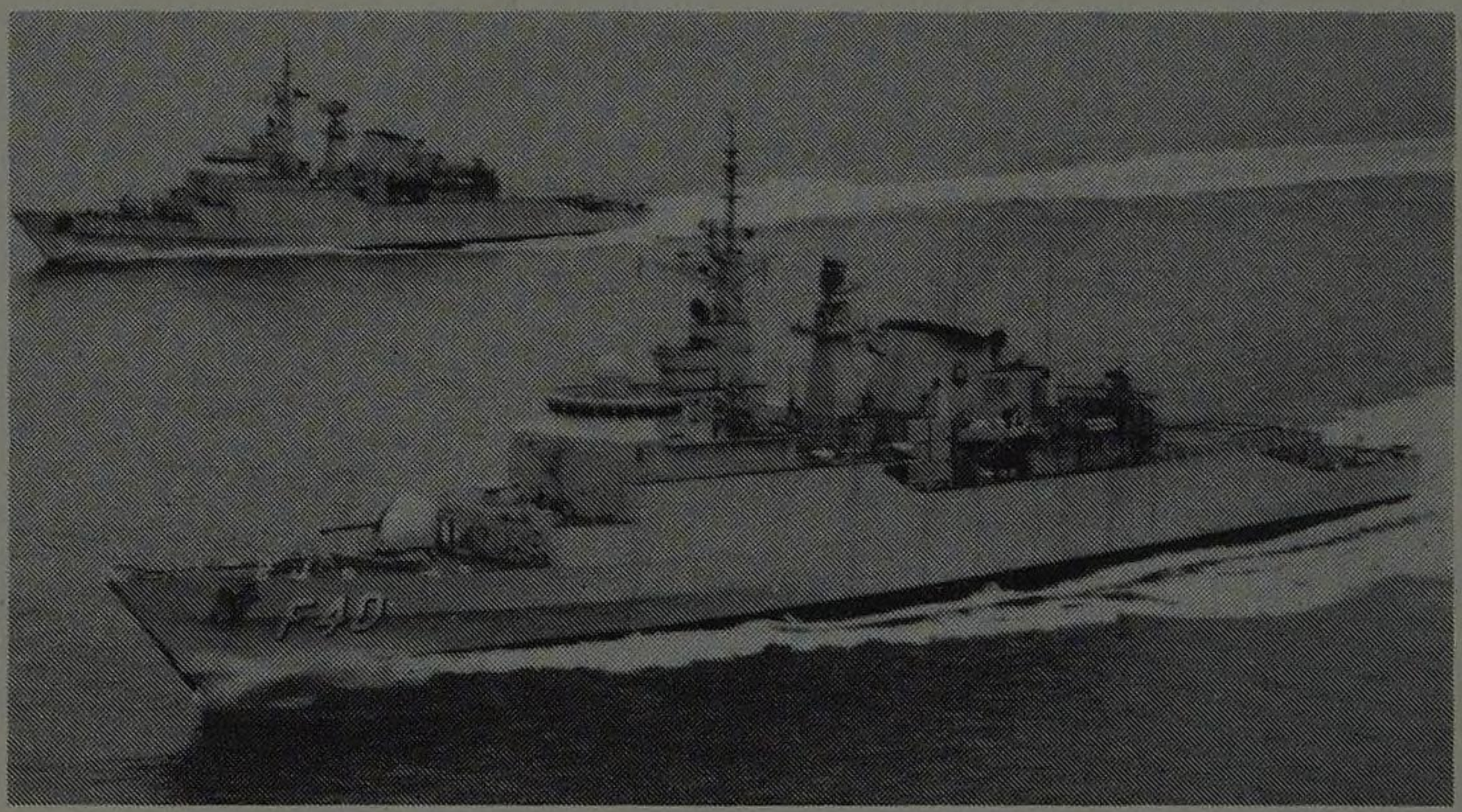
Works, and the West Coast-based Todd Shipyards. Quantities involved in the US Navy shipbuilding programme have been varied from time to time, but it now appears likely to be finalised around a 54 ship class, of which 24 should have been delivered by the end of 1982. The first export customer for the Perry class was the Royal Australian Navy, who have ordered 4 ships to date, comprising: HMAS *Adelaide* (FFG01), commissioned in November 1980; HMAS *Canberra* (FFG02), commissioned in March 1982; HMAS *Sydney* (FFG03) and HMAS *Darwin* (FFG04), to be commissioned in 1983 and 1984, respectively. Spain is building 3 vessels of this class in their own yards, the first of these Bazan-built ships being laid in mid-1981. More recently, the Turkish Government has negotiated the building of 2 Perry class in their Golcuk naval shipyards and hold options to construct 2 more.

Notes: Unlovely-looking ships, the Perry class were designed for modular assembly to facilitate high-rate series production. In operational terms, the Perry class has been produced to provide oceangoing escort for merchantmen or a naval amphibious task force. As a result of the potential combat damage vulnerability of the single shaft/propeller arrangement adopted for the ship (itself an economy measure allowing the use of a standard Spruance class propulsion cell to be employed), the Perry class frigates are equipped with 2 diesel-driven retractable thrusters that can propel the ship through the water at up to 5 knots, should the main propulsion be lost.



Perry showing the short funnel just forward of the helicopter pad.

Niteroi class

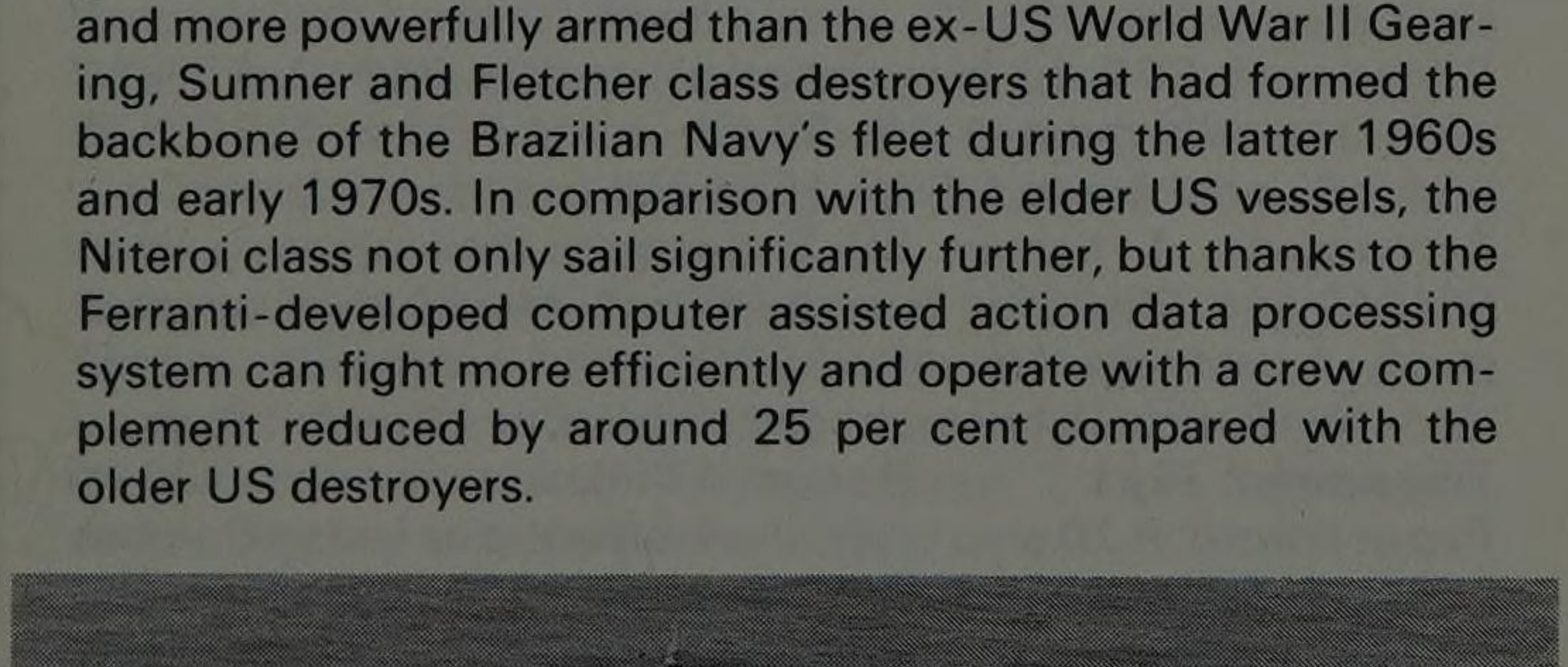


Niteroi (F40) and *Defensora* (F41) anti-submarine frigates, 1977.

Roles: Anti-submarine (AS) version: F40, F41, F44 and F45. General-purpose (GP) versions: F42 and F43.
Builders: Vosper Thornycroft, UK; F40, F41, F42 and F43. Brazilian Naval Dockyards, Brazil: F44 and F45.
User: Brazilian Navy.
Basic data: 3,645 t full displacement; 424 ft (129.2 m) overall length; 44.25 ft (13.5 m) maximum beam. **Crew**: 201.
Propulsion: 2 Rolls-Royce TM3B Olympus gas turbines (total 56,000 shp) or 4 MTU MA 16V 956 diesels (total 14,560 bhp); CODOG; 2 c-p propellers.
Sensors: 1 Plessey AWS-2 air search radar/IFF; Hollandse ZW06 surface search and nav radar; 2 Selenia Orion fire control radars; 1 Edo 610E hull-mounted sonar (plus Edo 700E variable depth towed sonar in AS versions); Ferranti CAAIS automated data processing.
Armament: 1 Westland Lynx helicopter; 4 Exocet anti-ship missile launchers (GP version only); 1 Vickers 4.5 in Mk 8 gun (a 2nd Mk 8 gun is fitted at the stern of GP version); 1 Ikara anti-submarine missile launcher (fitted to AS version only); 2 triple Seacat short range air defence missile launcher; 1 twin Bofors 375 mm anti-submarine rocket launcher; 2 Bofors 40 mm L70 guns; 2 Plessey triple anti-submarine lightweight torpedo tubes.
Top speed: 30 kt. **Range**: 5,300 nautical miles at 17.5 kt.

Programme: Early in 1970, the Brazilian Government invited tenders for a new 6 ship class of large frigate, the contract for which was won by Vosper Thornycroft in September 1971. Under the terms of the contract, Vosper Thornycroft would build the first 4 ships, while 2 more would be built in Brazil. All laid down between June 1972 and June 1975, the 4 Vosper-built ships, *Niteroi* (F40), *Defensora* (F41), *Constituicao* (F42) and *Liberal* (F43), were all accepted between November 1976 and November 1978, while the 2 Brazilian-built vessels, *Independencia* (F44) and *Unico* (F45), entered service in November 1979 and September 1980, respectively, after having both been laid down in June 1972.

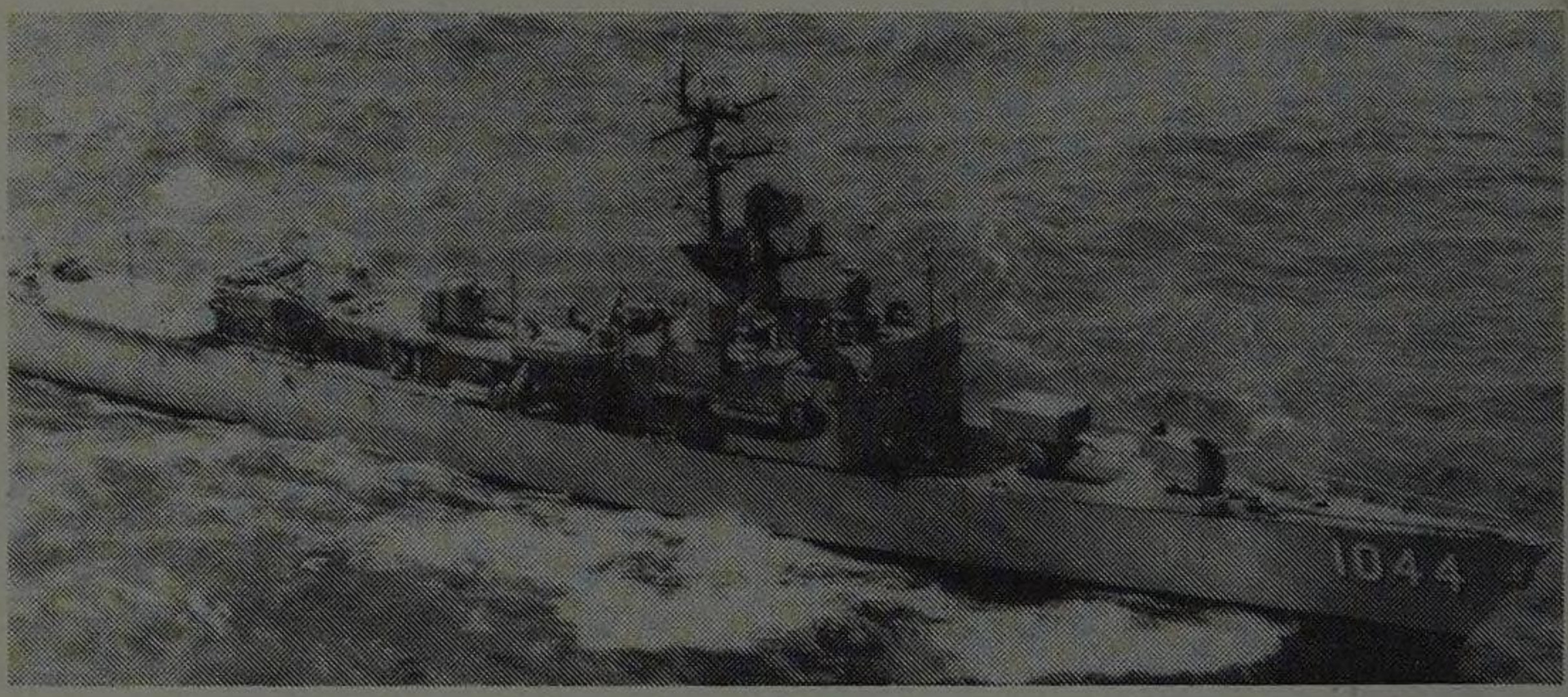
Notes: These Mark 10 frigates , to use the builder's designation, clearly carry the stamp of Vosper Thornycroft in almost every line of their beautifully proportioned hull and superstructure. Larger and heavier than Vosper Thornycroft's Amazon class that immediately preceded them through the company's yards, the Niteroi class provide yet another example of the growth in size of the modern frigate, being considerably heavier and more powerfully armed than the ex-US World War II Gearing, Sumner and Fletcher class destroyers that had formed the backbone of the Brazilian Navy's fleet during the latter 1960s and early 1970s. In comparison with the elder US vessels, the Niteroi class not only sail significantly further, but thanks to the Ferranti-developed computer assisted action data processing system can fight more efficiently and operate with a crew complement reduced by around 25 per cent compared with the older US destroyers.



Constituicao (F42) general-purpose frigate, 1978.

Garcia class

Frigates



The Garcia class frigate, USS *Brumby* (FF1044).

Role: Anti-submarine.

Builders: Various, USA.

User: US Navy.

Basic data: 3,400 t full displacement; 414.5 ft (126.3 m) overall length; 44.2 ft (13.5 m) maximum beam. **Crew**: 270.

Propulsion; 1 Westinghouse geared steam turbine (35,000 shp); 1 propeller.

Sensors: 1 SPS-40 long-range air search radar; 1 SPS-10 surface search radar; 1 Mk 35 fire control radar; 1 SQS-26 bow-mounted sonar; 1 SQR-15 towed array sonar system.

Armament: 1 Kaman SH-2 Seasprite helicopter (except FF1048 and FF1050); 2 single 5 inch Mk 30 dual-purpose guns; 1 octuple Mk 16 ASROC anti-submarine missile launcher; 2 triple lightweight anti-submarine torpedo tubes.

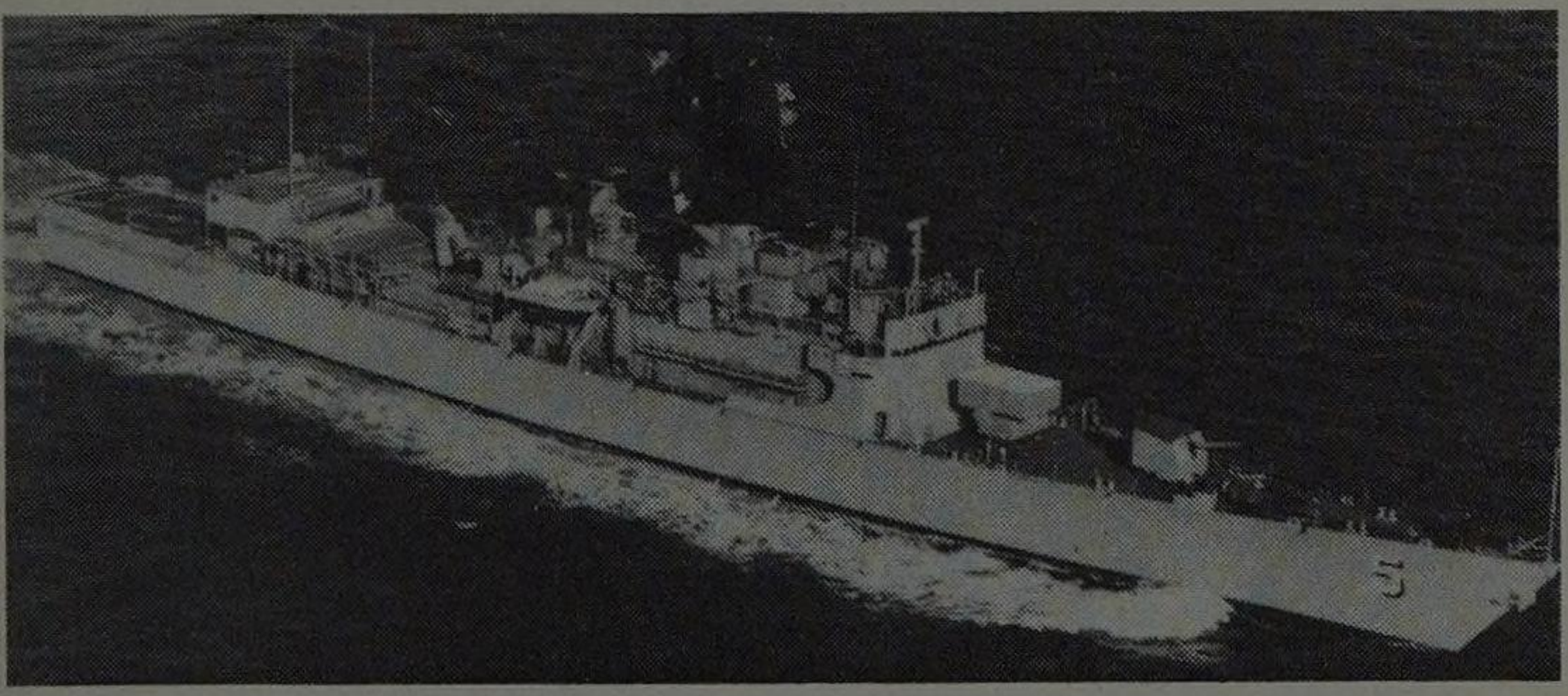
Top speed: 27 kt. **Range**: 4,000 nautical miles at 20 kt.

Programme: A 10 ship class, the first keel was laid in October 1962 and the last ship completed by July 1968. Shipyards were Bethlehem Steel, being responsible for the 1st and 2nd, Avondale Shipyards built the 3rd, 4th and 5th, Defoe Shipbuilding completed the 6th, 8th and 10th, and Lockheed Shipbuilding delivered the 7th and 9th. The class consists of USS *Garcia* (FF1040), USS *Bradley* (FF1041), USS *Edward McDonnell* (FF1043), USS *Brumby* (FF1044), USS *Davidson* (FF1045), USS *Voge* (FF1047), USS *Sample* (FF1048), USS *Koelsck* (FF1049), USS *Albert David* (FF1050), and USS *O'Callahan* (FF1051).

Notes: Contemporaries of the Brooke class but lacking effective air defence capability.

Brooke class

Frigates



USS *Richard L. Page* (FFG5), part of the US Atlantic Fleet.

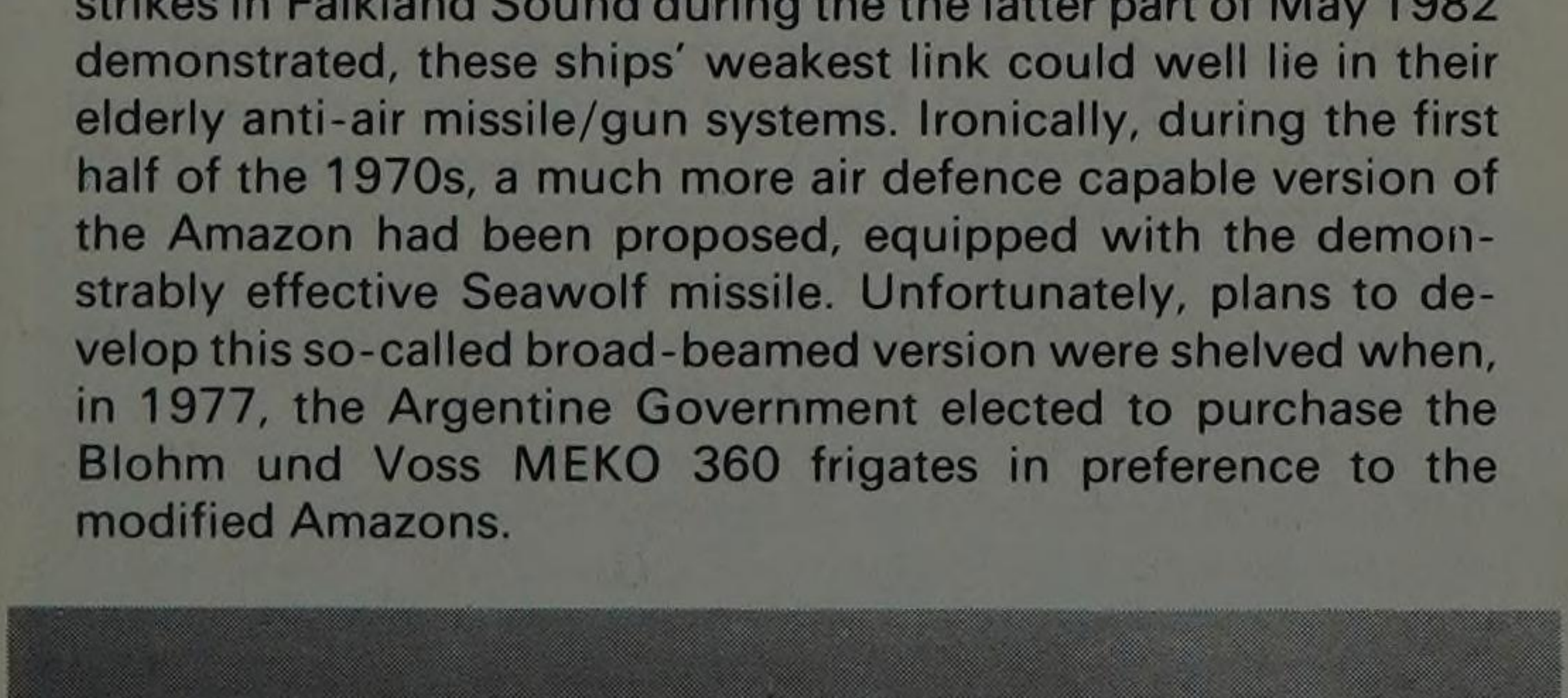
Role: Anti-submarine.
Builders: Lockheed & Bath Iron Works, USA.
User: US Navy.
Basic data: 3,245 t full displacement; 414.5 ft (126.3 m) overall length; 44.2 ft (13.5 m) maximum beam. **Crew**: 255.
Propulsion: 1 geared steam turbine (35,000 shp); 1 propeller.
Sensors: 1 SPS-52D combined air search and height finder (3-D) radar; 1 SPS-10F surface search radar; 1 SPG-51C missile fire control radar; 1 Mk 35 gun fire control radar; 1 SQS-26AX bow-mounted sonar.
Armament: 1 Kaman SH-2 Seasprite helicopter; 1 single Mk 22 Tartar/Standard MR area air defence missile launcher; 1 single 5 inch Mk 30 dual-purpose gun; 1 octuple Mk 16 ASROC anti-submarine missile launcher; 2 triple lightweight anti-submarine torpedo tubes.
Top speed: 27 kt. **Range**: 4,000 nautical miles at 20 kt.
Programme: Ordered in 2 batches of 3 ships during the 1962/3 period, this 6 ship class comprises: USS *Brooke* (FFG1), USS *Ramsey* LFFG2), USS *Schofield* (FFG3), USS *Talbot* (FFG4), USS *Richard L. Page* (FFG5) and USS *Julius A. Furer* (FFG6). Lockheed Shipbuilding built the first 3 ships, with Bath Iron Works responsible for the others. Built between December 1962 and November 1967, all ships entered service between March 1966 and November 1967.
Notes: Employing the same hull design and layout as that of the Garcia class, the Brookes differ only in replacing the aft 5 inch gun with the Tartar/Standard missile launcher.

Amazon class

HMS *Amazon* (F169) during sea trials in 1974.

Role: General-purpose.
Builders: Vosper Thornycroft & Yarrow, UK.
User: Royal Navy.
Basic data: 3,250 t full displacement; 384 ft (117.0 m) overall length; 41.75 ft (12.7 m) maximum beam. **Crew**: 171.
Propulsion: 2 Rolls-Royce TM3B Olympus gas turbines (total 56,000 shp) or 2 Rolls-Royce Tyne RMIA gas turbines (total 8,000 shp); COGOG; 2 c-p propellers.
Sensors: 1 Type 992Q air search radar; 1 Type 978 or 1006 nav radar; 2 Selenia Orion missile/gun fire control radars; 4 hull-mounted sonars (Types 162M, 170B, 174, and 184).
Armament: 1 Westland Lynx helicopter; 4 Exocet anti-ship missile launchers (not on F169); 1 Vickers 4.5 in Mk 8 gun; 1 quadruple Seacat surface-to-air missile launcher; 2 Oerlikon 20 mm guns; 2 triple anti-submarine lightweight-torpedo tubes.
Top speed: 32 kt. **Range**: 4,300 nautical miles at 17 kt.
Programme: All 8 of these Type 21 frigates, as the ships were first known, were ordered within a 20 month period commencing late March 1969, the first 3 as set out below being ordered from Vosper Thornycroft, the lead yard, while the last 5 were contracted from Yarrow. The ships and their commissioning dates are: HMS *Amazon* (F169), May 1974; HMS *Antelope* (F170), July 1975; HMS *Active* (F171), June 1977; HMS *Ambuscade* (F172), September 1975; HMS *Arrow* (F173),

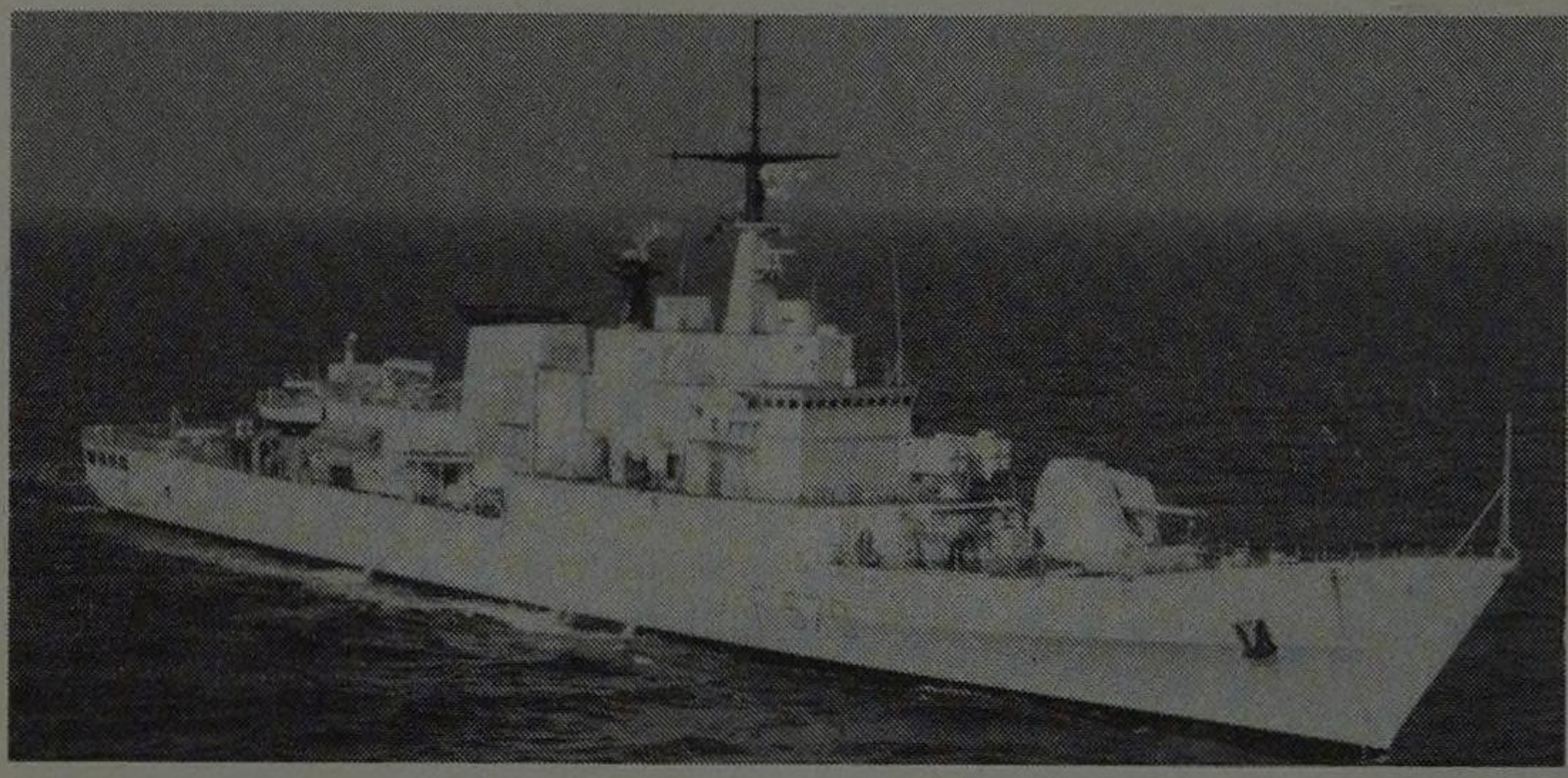
July 1976; HMS *Alacrity* (F174), July 1977; HMS *Ardent* (F184), October 1977; and HMS *Avenger* (F185), May 1978.
Notes: Sleek, fast and agile, the Type 21 or Amazon class ships established a number of precedents when they came into service, being the first Royal Navy warships of modern times not to have been designed by that service, along with which, they were the first Royal Navy warship to be designed around all gas turbine propulsion from the outset. The fruit of a collaborative design effort between Vosper Thornycroft and Yarrow, in which the former were to lead, the Amazons made extensive use of aluminium within the ship's superstructure, saving some 60 tons of above deck weight. Unfortunately, as a dockyard fire was to show, aluminium burns much more readily than steel, resulting in a retrofit programme of replacing former aluminium companionways (ladders) and other fittings with items built of less combustible steel. In terms of handling and sea-keeping, the Amazon class have proven to be fine ships, but, sadly, as the loss of HMS *Ardent* and HMS *Antelope* to Argentinian air strikes in Falkland Sound during the the latter part of May 1982 demonstrated, these ships' weakest link could well lie in their elderly anti-air missile/gun systems. Ironically, during the first half of the 1970s, a much more air defence capable version of the Amazon had been proposed, equipped with the demonstrably effective Seawolf missile. Unfortunately, plans to develop this so-called broad-beamed version were shelved when, in 1977, the Argentine Government elected to purchase the Blohm und Voss MEKO 360 frigates in preference to the modified Amazons.



HMS *Ambuscade* (F172), the first of the Yarrow-built ships.

Maestrale class

Frigates

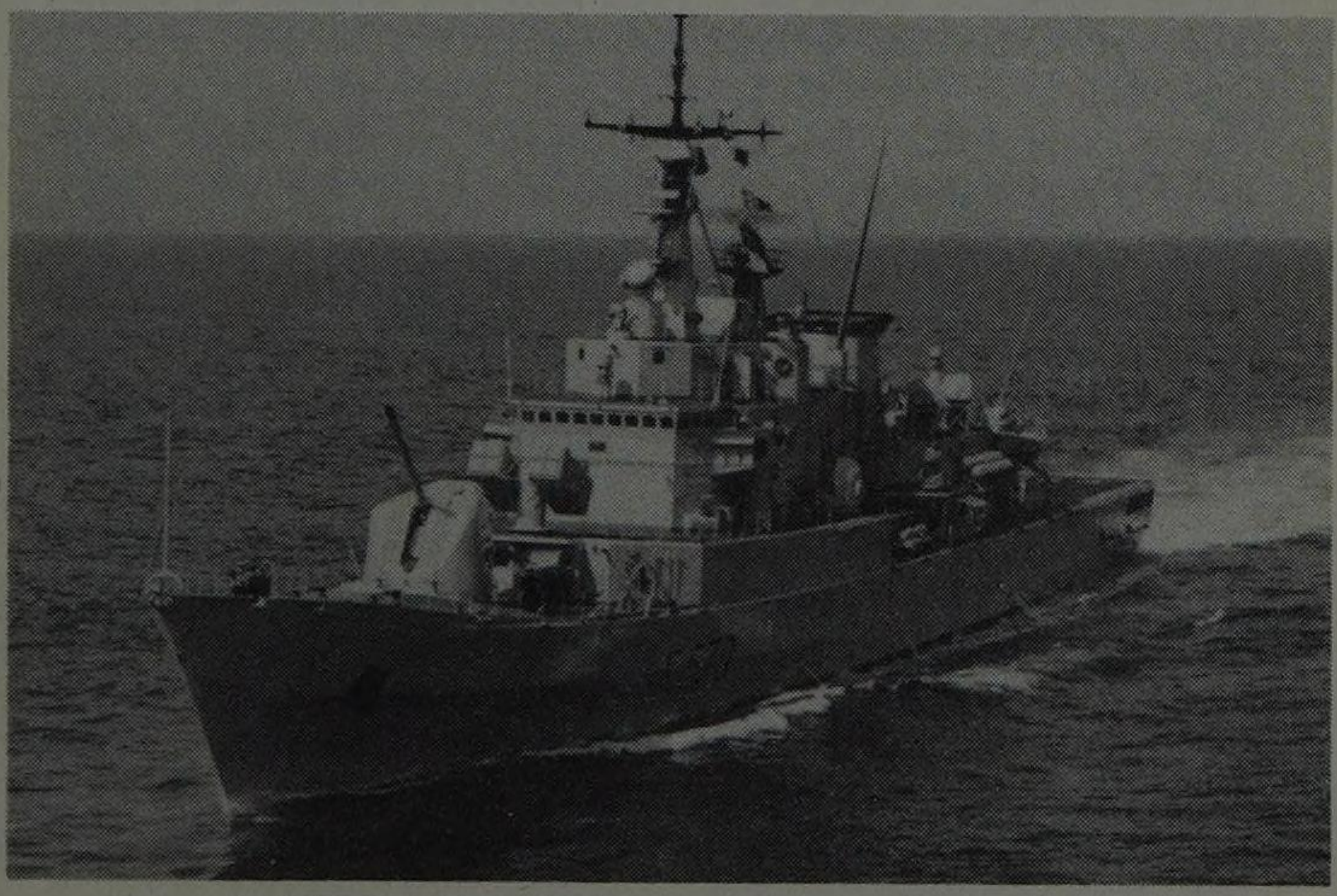


Italian Navy's *Maestrale* (F570) on sea trials, 1982.

Role: Anti-submarine. **Builder**: CNR, Italy.
User: Italian Navy.
Basic data: 3,040 t full displacement; 402.65 ft (122.73 m) overall length; 42.25 ft (12.88 m) maximum beam. **Crew**: 232.
Propulsion: 2 General Electric LM2500 gas turbines (total 50,000 shp) or 2 GMT B230-20DVM diesels (total 14,160 bhp); CODOG; 2 c-p propellers.
Sensors: 1 Selenia RAN 10S primary air/sea search radar; 1 SMA MM/SPS-702 close-in air/sea search radar; 1 SMA 3RM20 nav radar; 1 ELSAG NA-30 fire control radar (guns); 2 Selenia RTN-30X fire control radars (missiles); 1 Raytheon DE 1164 integrated hull and variable depth sonars; Selenia IPN-10 automated action information data processing.
Armament: 2 Agusta-Bell 212 helicopters; 4 Otomat Mk 2 anti-ship missile launchers; 1 OTO-Melara 127 mm gun; 1 octuple Aspide medium-range air defence missile launcher; 2 Breda/Bofors 40 mm anti-aircraft guns; 2 each heavyweight and lightweight anti-submarine torpedo tubes.
Top speed: 33 kt. **Range**: 6,000 nautical miles at 15 kt.
Programme: Subject of a special piece of Italian Government legislation passed in 1975 approving the construction of 8 Maestrale class frigates, 2 ships were deleted from the planned programme in 1977, but restored in October 1980. The class comprises: *Maestrale* (F570), *Grecale* (F571), *Libeccio* (F572), *Scirocco* (F573), *Aliseo* (F574), *Euro* (F575), *Espero*

(F576), and *Zeffiro* (F577). The first of class, *Maestrale* (F570), was laid down in November 1977, launched in February 1981 and set out on its initial sea trials in September 1981. All 8 ships are scheduled to be in service by 1984.

Notes: Although exhibiting a strong family resemblance to the smaller Lupo class frigates that came from the same drawing boards, the Maestrale class is, in mission terms, more readily related to the Kortenaer/Bremen class open ocean submarine hunters. Of well proportioned, if somewhat angular lines the Maestrale class, along with the Lupos, are the first of the modern, gas turbine boosted European or US frigates to reverse the downward trend in terms of top speed, the former being designed to achieve 32.5 knots with 6 months of hull exposure to marine encrustation. Already well-armed by Western world standards, provision exists to equip these ships with a hangar roof located close-in weapons system at some future date. The Mk 2 Otomat anti-ship missile with which the Maestrales are equipped have demonstrated a range capability in excess of 97 nautical miles, while the Mach 2.0 Aspide (Italian version of the Sea Sparrow) air defence missile has a range of around 5.4 nautical miles.



Maestrale (F570) with its 127 mm gun in an anti-aircraft elevation.

Leander class

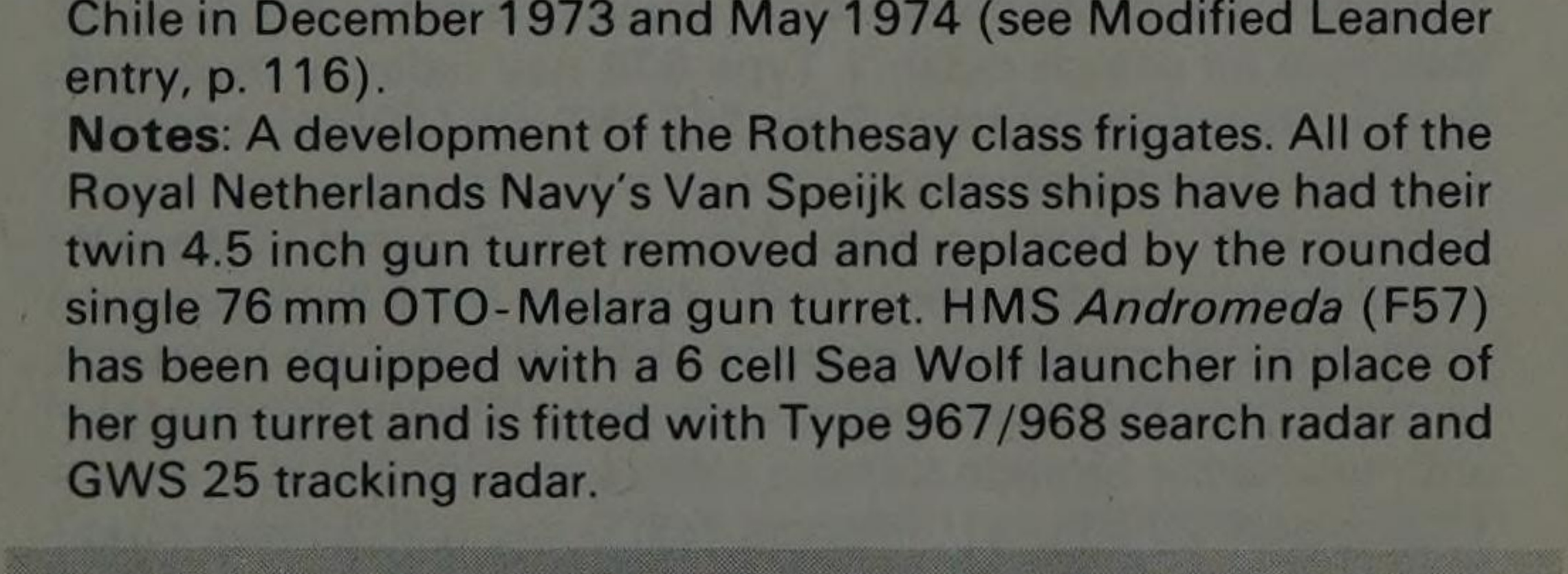
Frigates

HMS *Ajax* (F114) with Ikara replacing gun turret.

Role: Anti-submarine.
Builders: Various UK, Indian and Dutch.
Users: Navies of India, Netherlands, New Zealand and UK.
Basic data: 2,860 t full displacement; 373 ft (113.7 m) overall length; 41 ft (12.5 m) or 43 ft (13.1 m) maximum beam on last 10 UK and 6 Indian ships. **Crew**: c.260.
Propulsion: 2 White E-E geared steam turbines (total 30,000 shp); 2 propellers.
Sensors: 1 Type 965 long-range air search radar on gun and Exocet equipped ships or 1 Type 993 low altitude air search radar on Ikara ships; 2 Type 903 Seacat fire control radars; 1 Type 975 or 978 nav radar; 1 Type 177 or 184 hull-mounted and 1 Type 162, 170B or 199 towed variable depth sonar (deleted from some ships); Ferranti CAAIS automated action information data processing.
Armament: 1 Westland Wasp or Lynx helicopter; 1 twin 4.5 inch Mk 6 dual-purpose gun, or 4 Exocet anti-ship missile launchers, or 1 Ikara anti-submarine missile launcher, or 1 sextuple Sea Wolf rapid response close-in air defence missile launcher; with the exception of the Sea Wolf ships, all carry 6 cell Seacat point air defence missile launchers, gun equipped ships having 1, Ikara ships having 2 and Exocet ships carrying 3; Ikara and Exocet ships have 2 single 40 mm anti-aircraft guns, while gun equipped ships have 2 single 20 mm anti-aircraft guns; 1 treble barrelled Limbo Mk 10 anti-submarine mortar (deleted from Exocet ships, which carry 2 triple lightweight anti-submarine torpedo tubes).
Top speed: 28.5 kt. **Range**: Up to 5,500 nautical miles at 12 kt.

Programme: All 26 Royal Navy ships were commissioned between March 1963 and February 1973. Having undergone extensive refits, the ships fall into 3 categories: the Ikara group, comprising HMS *Leander* (F109), HMS *Ajax* (F114), HMS *Aurora* (F10), HMS *Euryalus* (F15), HMS *Galatea* (F18), HMS *Arethusa* (F38), HMS *Naiad* (F39) and HMS *Dido* (F104); the Exocet group, comprising HMS *Cleopatra* (F28), HMS *Minerva* (F45), HMS *Phoebe* (F42), HMS *Sirius* (F40), HMS *Argonaut* (F56), HMS *Juno* (F52), HMS *Danae* (F47) and HMS *Penelope* (F127); and the Broad-Beamed group, still largely gun-equipped, comprising HMS *Andromeda* (F57), HMS *Scylla* (F71), HMS *Hermione* (F58), HMS *Achilles* (F12), HMS *Jupiter* (F60), HMS *Diomede* (F16), HMS *Bacchante* (F69), HMS *Apollo* (F70), HMS *Charybdis* (F75) and HMS *Ariadne* (F72). The 2 British-built New Zealand vessels, HMNZS *Waikato* (F55) and HMNZS *Canterbury* (F421), were accepted 1966 and 1971, respectively. Two Dutch shipyards built 6 ships known as Van Speijk class, all accepted into service between 1967 and 1968. Six more were locally built in India between 1972 and 1980, while 2 British-built ships were delivered to Chile in December 1973 and May 1974 (see Modified Leander entry, p. 116).

Notes: A development of the Rothesay class frigates. All of the Royal Netherlands Navy's Van Speijk class ships have had their twin 4.5 inch gun turret removed and replaced by the rounded single 76 mm OTO-Melara gun turret. HMS *Andromeda* (F57) has been equipped with a 6 cell Sea Wolf launcher in place of her gun turret and is fitted with Type 967/968 search radar and GWS 25 tracking radar.



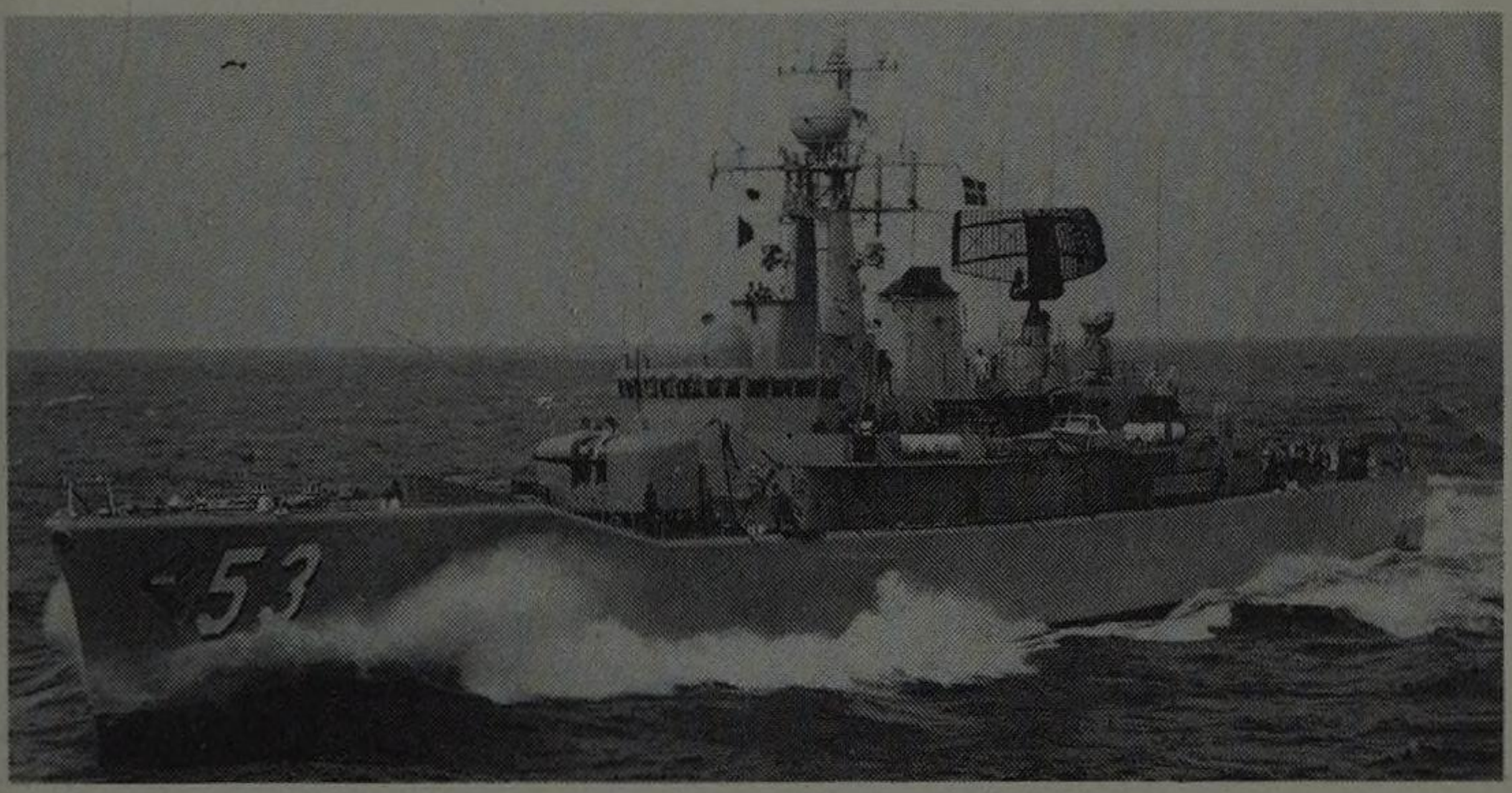
The Exocet-equipped HMS *Sirius* (F40).

Modified Leander class Frigates

The Chilean Navy frigate *Condell* (F06), 1977.

Role: General-purpose.
Builder: Yarrow, UK.
User: Chilean Navy.
Basic data: 3,200 t full displacement; 372 ft (113.4 m) overall length; 43 ft (13.1 m) maximum beam. **Crew**: 253.
Propulsion: 2 White E-E geared steam turbines (total 30,000 shp); 2 propellers.
Sensors: 1 Type 965 long-range air search radar; 1 Type 992 low-level air search radar; 1 Type 978 nav radar; 1 Type 903 Seacat fire control radar; 1 Type 162, 1 Type 170B and 1 Type 177 hull-mounted sonars.
Armament: 1 Aerospatiale Alouette helicopter; 4 Exocet anti-ship missile launchers; 1 twin 4.5 inch Mk 6 dual-purpose guns; 1 quadruple Seacat point air defence missile launcher; 2 single 20 mm Oerlikon anti-aircraft guns; 2 triple lightweight anti-submarine torpedo tubes.
Top speed: 28.5 kt. **Range**: 5,500 nautical miles at 12 kt.
Programme: Ordered in January 1970, this 2 ship class comprises *Condell* (F06) and *Lynch* (F07). Laid down in June 1971 and December 1972, the ships were launched in December 1972 and June 1973, entering service in December 1973 and May 1974, respectively.
Notes: Based on the hull and machinery of the existing broad-beamed Leanders, the design of these ships was modified to meet the specific needs of the Chilean Navy, which included additional fuel oil tankage endurance and the stern Exocet launcher installation, which permits retention of the forward gun.

Improved River class Frigates



HMAS *Torrens* (F53), 1975.

Role: Anti-submarine. **Builders**: Various, Australia.
User: Royal Australian Navy.
Basic data: 2,750 t full displacement; 370 ft (112.8 m) overall length; 41 ft (12.5 m) maximum beam. **Crew**: 250.
Propulsion: 2 Geared steam turbines (total 30,400 shp); 2 propellers.
Sensors: 1 Hollandse LWO2 long-range air search radar; 1 nav radar; 2 Hollandse M22 fire control radars; 3 sonars (Type 162, 170 and 177).
Armament: 1 twin 4.5 inch Mk 6 dual-purpose gun; 1 Ikara anti-submarine missile launcher; 1 twin Seacat point air defence missile launcher; 1 Limbo anti-submarine mortar; 6 lightweight anti-submarine torpedo tubes.
Top speed: 27 kt. **Range**: 4,500 nautical miles at 12 kt.
Programme: During the early 1960s, 4 River class frigates were built by the Naval Dockyard at Williamstown and the Cockatoo Island yard at Sydney. These ships, HMAS *Yarra* (F45), HMAS *Parramatta* (F46), HMAS *Stuart* (F48) and HMAS *Derwent* (F49), were based on the Royal Navy's Rothesay class. This quartet was followed some 6 years on by HMAS *Swan* (F50) and HMAS *Torrens* (F53), built by the Naval Dockyard and Cockatoo and commissioned in January 1970 and January 1971, respectively.
Notes: The Improved River class ships, although marginally shorter, closely resemble the Royal Navy's Leander class ships.

Annapolis class

Frigates

HMCS *Annapolis* (FFH265) steaming in Atlantic waters.

Role: Anti-submarine. **Builders**: Various, Canada.
User: Canadian Armed Forces, Marine Command.
Basic data: 3,000 t full displacement; 371 ft (113.1 m) overall length; 42 ft (12.8 m) maximum beam. **Crew**: 228.
Propulsion: 2 English Electric geared steam turbines (total 30,000 shp); 2 propellers.
Sensors: 1 SPS-12 air search radar; 1 SPS-10 surface search radar; 1 Sperry Mk 2 fire control radar; 1 TACAN aircraft homer; 1 SQS-501, 1 SQS-503 and 1 SQS-505 hull-mounted sonars.
Armament: 1 Sikorsky SH-3 Sea King helicopter; 1 twin 76 mm Mk 22 dual-purpose gun; 1 Mk 10 Limbo anti-submarine mortar; 2 triple lightweight anti-submarine torpedo tubes.
Top speed: 28 kt. **Range**: 4,750 nautical miles at 14 kt.
Programme: This 2 ship class comprises HMCS *Annapolis* (FFH265) and HMCS *Nipigon* (FFH266). Built by Halifax Shipyards and Marine Industries, respectively, these ships both entered service during 1964, having been laid down in 1960. The Annapolis class ships, along with the 4 ship Improved Restigouche class destroyers in service with the Canadian Armed Forces, will undergo a major programme of modernisation during the next few years.
Notes: Functional, if rather unbeautiful ships, the Annapolis class are characterised by their small, side by side-mounted funnels that project from the forward end of the helicopter hangar. Air defence capability is limited for a ship of this size.

Rothesay class

Frigates

The Rothesay class frigate HMS *Brighton* (F106).

Role: Anti-submarine.

Builders: Various, UK.

User: Royal Navy.

Basic data: 2,800 t full displacement; 370 ft (112.8 m) overall length; 41 ft (12.5 m) maximum beam. **Crew**: 251.

Propulsion: 2 English Electric geared steam turbines (total 30,000 shp); 2 propellers.

Sensors: 1 Type 993 low-level air and surface search radar; 1 Type 978 nav radar; 1 Type 903 gun fire control radar; 1 each of Types 162, 190 and 174 hull-mounted sonars.

Armament: 1 Westland Wasp helicopter; 1 twin 4.5 inch Mk 6 dual-purpose gun; 1 quadruple Seacat point air defence missile launcher; 2 single 20 mm Oerlikon aircraft guns; 1 triple-barrel Limbo Mk 10 anti-submarine mortar.

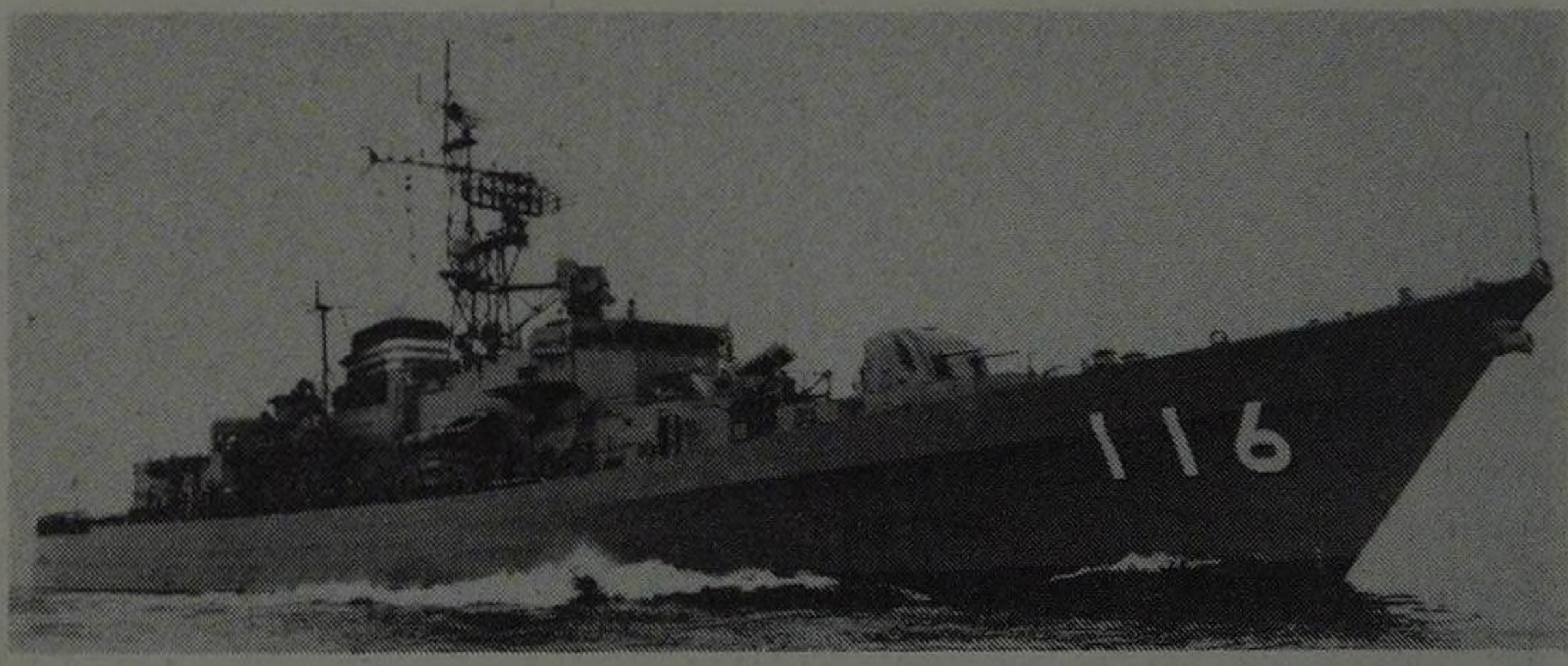
Top speed: 30 kt. **Range**: 4,500 nautical miles at 12 kt.

Programme: Originally a 9 ship class completed between March 1960 and October 1961, only 4 of these Type 12 frigates, HMS *Yarmouth* (F101), HMS *Rothesay* (F107), HMS *Plymouth* (F126) and HMS *Rhyl* (F129), remained in active service by early 1982, with HMS *Londonderry* (F108) and HMS *Lowestoft* (F103) serving as trial ships. HMS *Berwick* (F115), HMS *Brighton* (F106) and HMS *Falmouth* (F113) had been scheduled to decommission during 1982, but one or more may stay in service following the Falkland action. Modernised between 1966 and 1972.

Notes: An improved version of the Whitby class, at least two of these ships, HMS *Yarmouth* and HMS *Plymouth*, served in the Falklands.

Minegumo class

Frigates



Minegumo (F116) of the Japanese Maritime Self-Defence Force.

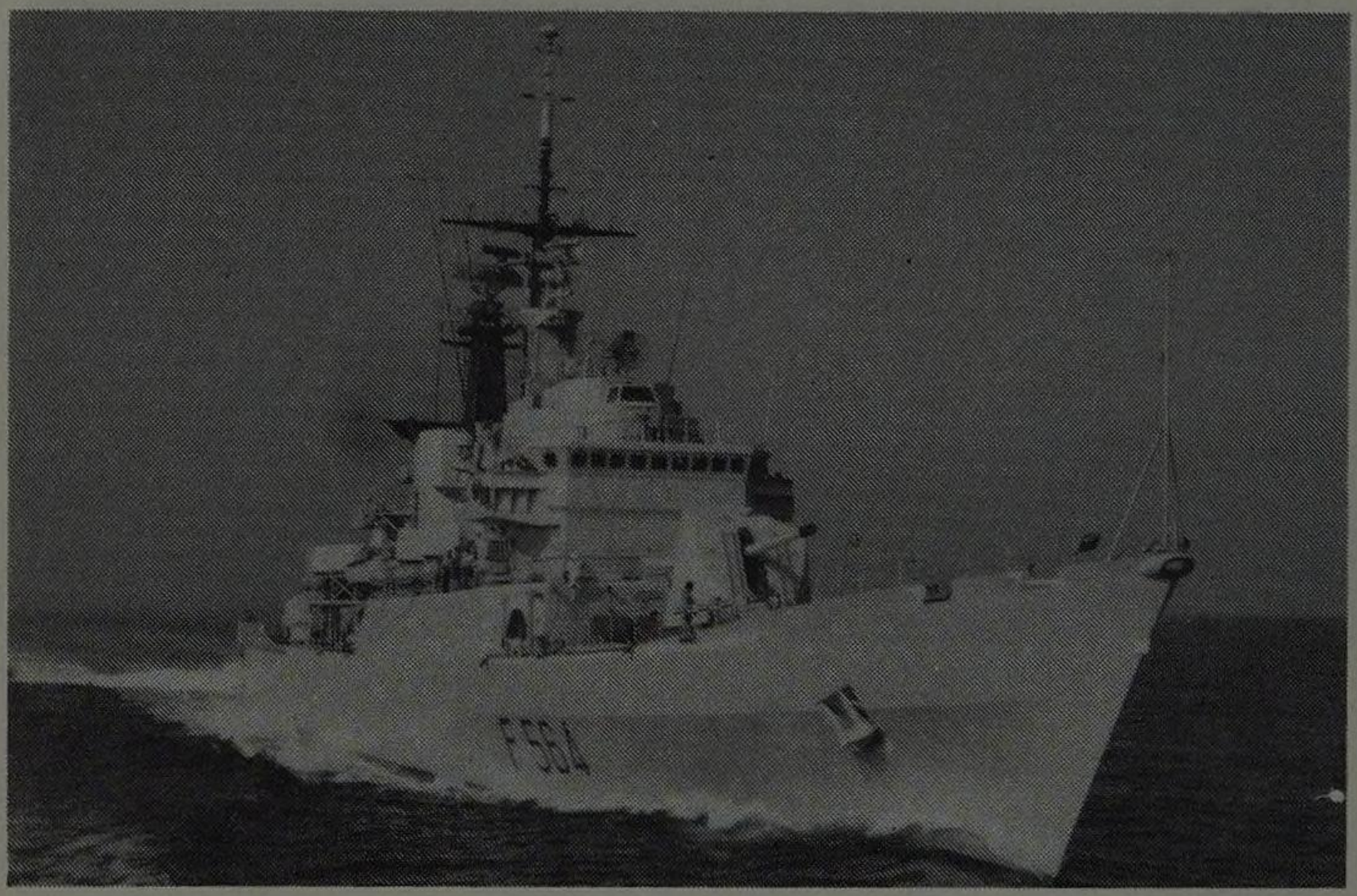
Role: Anti-submarine. **Builders**: Various, Japan.
User: Japanese Maritime Self-Defence Force.
Basic data: 2,750 t full displacement; 377 ft (114.9 m) overall length; 37.7 ft (11.8 m) maximum beam. **Crew**: 215.
Propulsion: 6 Mitsubishi 12UEV 30/40 diesels (total 26,500 bhp); 2 propellers.
Sensors: 1 OPS 11 long-range air search radar; 1 OPS 17 surface search and nav radar; 1 SPG-34 gun fire control radar; 1 OQS 3 hull-mounted sonar; 1 SQS-35 towed variable depth sonar on F118.
Armament: 2 twin 76 mm dual-purpose guns; 1 Bofors 375 mm anti-submarine rocket launcher; 2 triple lightweight anti-submarine torpedo tubes. Note: F118 carries 1 octuple Mk 16 launcher for ASROC anti-submarine missile aft and has had aft twin gun turret replaced by 1 single 76 mm OTO-Melara gun. All 3 ships will be fitted with ASROC and all 3 will end up with OTO-Melara guns.
Top speed: 27 kt. **Range**: 7,000 nautical miles at 20 kt.
Programme: This 3 ship class comprises *Minegumo* (F116), *Natsugumo* (F117) and *Murakumo* (F118), built by Mitsui, Uraga and Maizuru, respectively. Laid down between March 1967 and October 1968, all 3 ships entered service between August 1968 and August 1970.
Notes: Finely proportioned, handsome ships, the Minegumo class are a development of the Yamagumo class vessels. The Minegumos may be most economic vessels to operate but appear generally underarmed, particularly in terms of anti-air capability.

Bronstein class

Frigates

USS *Bronstein* (FF1037) in the South China Sea, 1975.

Role: Anti-submarine. **Builder**: Avondale, USA.
User: US Navy.
Basic data: 2,650 t full displacement; 350 ft (106.7 m) overall length; 40.5 ft (12.3 m) maximum beam. **Crew**: 208.
Propulsion: 1 De Laval geared steam turbine (20,000 shp); 1 propeller.
Sensors: 1 SPS-40 air search radar; 1 SPS-10 surface search radar; 1 MK 35 gun control radar; 1 SQS-26 bow-mounted sonar; 1 SQR-15 towed array sonar system.
Armament: 1 twin 3 inch Mk 33 anti-aircraft gun; 1 octuple Mk 16 launcher for ASROC anti-submarine missiles; 2 triple lightweight anti-submarine torpedo tubes.
Top speed: 24 kt. **Range**: 2,300 nautical miles at 20 kt.
Programme: Ordered during the US Fiscal Year 1960, this 2 ship class comprises USS *Bronstein* (FF1037) and USS *McCloy* (FF1038). Laid down in May 1961 and September 1961, the ships were commissioned in June 1963 and October 1963, respectively.
Notes: The smallest of the US Navy's deep water-going combatants, the Bronsteins were to be the lead ship of a new class of escorts, but were to prove the victims of advancing naval operational needs, such as the ability to operate manned helicopters. Perhaps the most surprising omission during subsequent refits was the decision not to fit a Sea Sparrow launcher immediately aft of the superstructure to cover the blind spot of the forward mounted anti-aircraft guns.

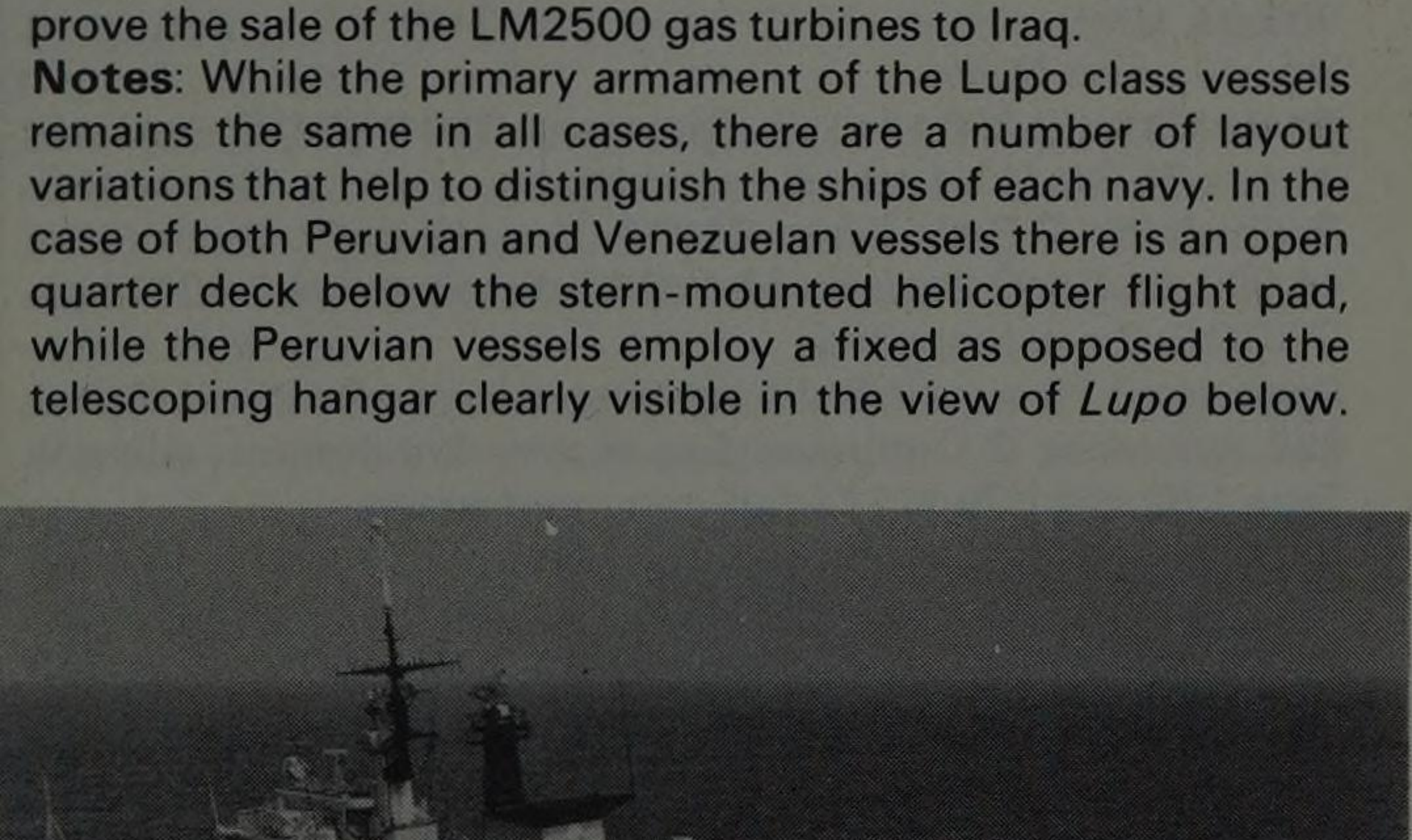


Italian Navy's *Lupo* (F564) at speed.

Role: General-purpose. **Builder**: CNR, Italy.
Users: Navies of Italy, Peru, Venezuela.
Basic data: 2,525 t full displacement; 371.4 ft (113.2 m) overall length; 37.1 ft (11.8 m) maximum beam. **Crew**: 185.
Propulsion: 2 General Electric LM2500 gas turbines (total 50,000 shp) or 2 GMT A320-20M diesels (total 8,490 bhp); CODOG; 2 c-p propellers.
Sensors: 1 Selenia RAN-10S primary air/sea search radar; 1 Selenia RAN-11XL close-in air/sea search and nav radar; 2 Selenia RTN-10X fire control radars (missile); 1 ELSAG NA-10 fire control radar (guns); 1 Raytheon 1160B hull-mounted sonar; Selenia IPN-10 automated action information data processing.
Armament: 1 Agusta-Bell 212 helicopter; 8 Otomat Mk 2 anti-ship missile launchers; 1 OTO-Melara 76 mm dual-purpose gun; 1 octuple Aspide medium-range air defence missile launcher; 2 twin Breda/Bofors 40 mm anti-aircraft guns; 2 triple lightweight anti-submarine torpedo tubes.
Top speed: 35 kt. **Range**: 4,350 nautical miles at 16 kt.
Programme: The 4 Lupo class frigates were ordered by Italy from 1974 through 1977. The ships are: *Lupo* (F564), which

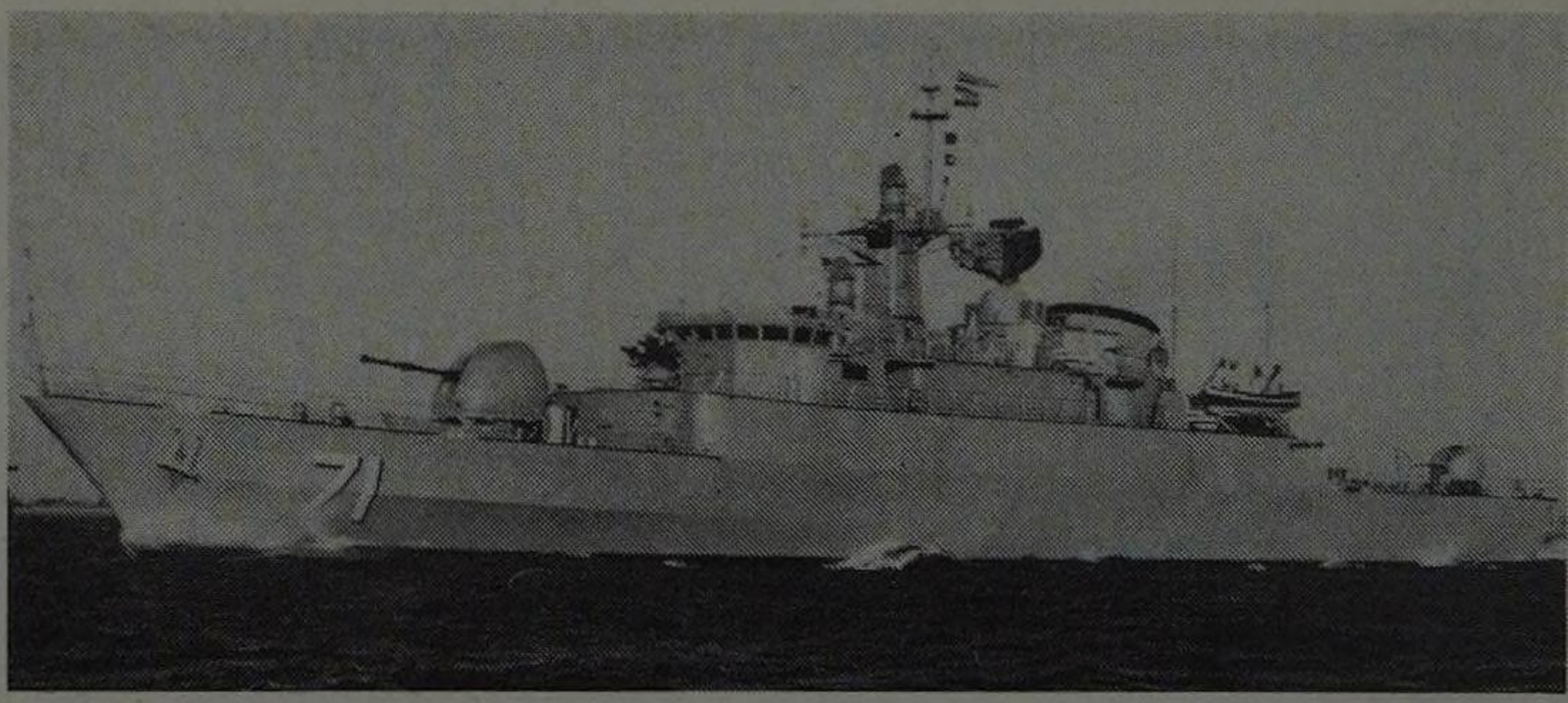
joined the fleet in September 1977; *Sagittario* (F565), in November 1978; *Perseo* (F566), February 1979; and *Orsa* (F567) in March 1980. Meanwhile, overseas orders had been placed by the navies of Peru and Venezuela for a further 10 ships, of which 4 were for Peru, with 2 to be built in that country, while Venezuela placed contracts for 6, all to be built in Italy. Of the Peruvian vessels, the 2 Italian-built ships, *Carvajal* (F51) and *Villavicencio* (F52), have been in service since 1979. *Mariscal Sucre* (F21), the first of the Venezuelan ships, entered service in November 1979, followed by *Almirante Brion* (F22) in 1980 and *General Urdaneta* (F23) in 1981. All 3 remaining ships, *General Soublette* (F24), *General Salom* (F25) and *Jose Felix Ribas* (F26), should have been delivered by the close of 1982. More recently, Iraq contracted for 4 of these ships, but their delivery has been delayed as a result of US reluctance to approve the sale of the LM2500 gas turbines to Iraq.

Notes: While the primary armament of the Lupo class vessels remains the same in all cases, there are a number of layout variations that help to distinguish the ships of each navy. In the case of both Peruvian and Venezuelan vessels there is an open quarter deck below the stern-mounted helicopter flight pad, while the Peruvian vessels employ a fixed as opposed to the telescoping hangar clearly visible in the view of *Lupo* below.



Lupo (F564) from astern, showing telescoping hangar aft.

Saam class (Mk 5)

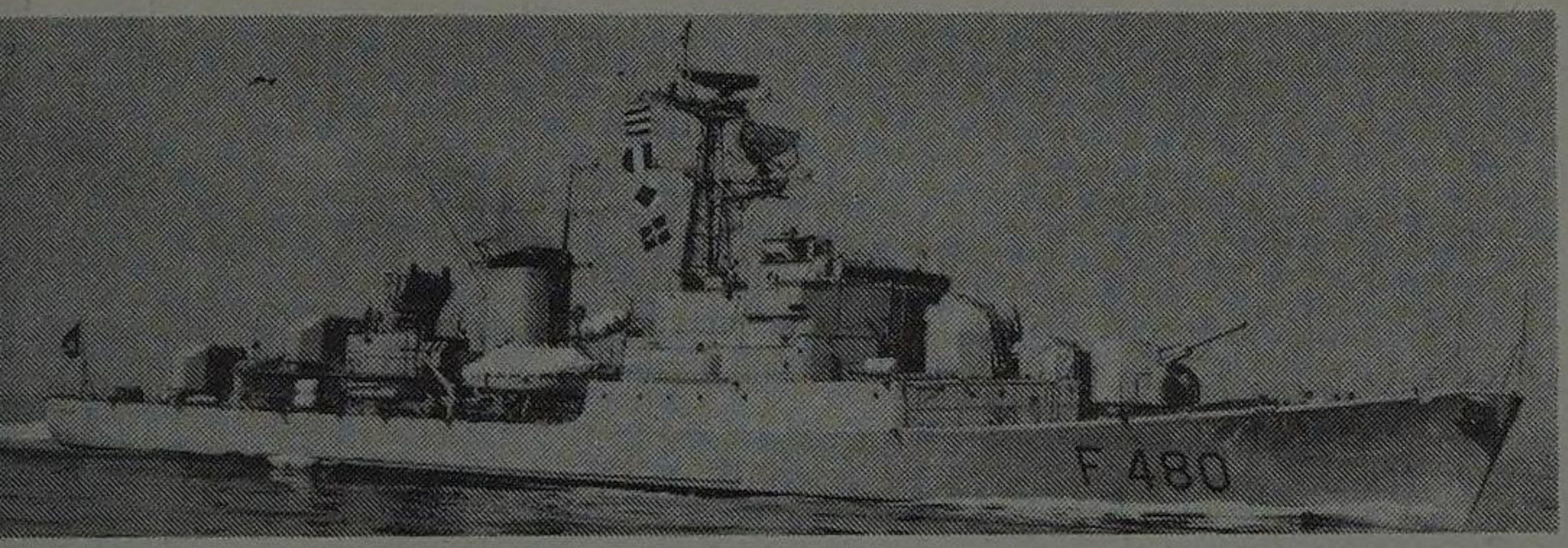


The Vosper Thornycroft-built Iranian frigate *Saam* (F71).

Role: General-purpose. **Builders**: Vosper Thornycroft & Vickers, UK.
User: Iranian Navy.
Basic data: 2,350 t full displacement; 310 ft (94.5 m) overall length; 36.3 ft (11.1 m) maximum beam. **Crew**: 139.
Propulsion: 2 Rolls-Royce TM3A Olympus gas turbines (total 44,600 shp) or 2 Paxman 16 YJMC diesels (total 3,800 bhp); CODOG; 2 c-p propellers.
Sensors: 1 Plessy AWS-1 long-range air search radar; 1 Decca 626 nav radar; 2 Contraves Sea Hunter fire control radars; 1 Type 170 and 1 Type 174 hull-mounted sonars.
Armament: 1 quintuple Sea Killer anti-ship missile launcher; 1 single 4.5 inch Vickers Mk 6 dual-purpose gun; 1 triple Seacat point air defence missile launcher; 1 twin 35 mm Oerlikon anti-aircraft gun; 1 Mk 10 anti-submarine mortar.
Top speed: 39 kt. **Range**: 3,220 nautical miles at 17.5 kt.
Programme: Ordered in early 1967, this 4 ship class comprises the *Saam* (F71), *Zaal* (F72), *Rostam* (F73) and *Faramarz* (F74). The first pair were built by Vosper Thornycroft, the lead yard, who delivered the ships between March and May 1972. The second pair, built by Vickers, were handed over simultaneously at the end of February 1972.
Notes: Extremely compact, handsomely proportioned ships, the Saam class are the fastest frigates extant. The Sea Killer anti-ship missile system employed on the Saams is of Italian origin and the Mk 2 version carries a 155 lb (70 kg) warhead out to a range of about 13.5 nautical miles (25 km).

Commandant Riviere class

Frigates

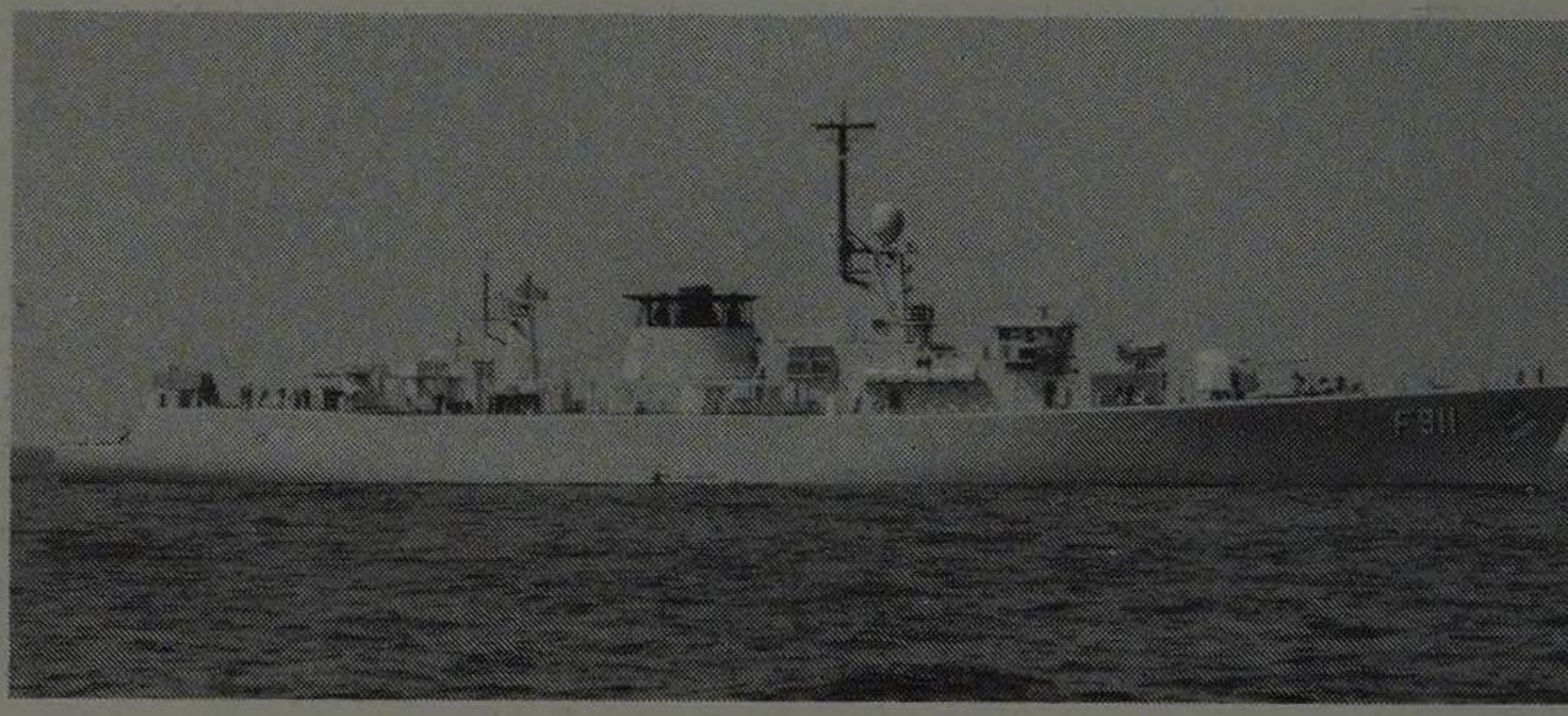


The Portuguese Navy's *Comandante Joao Belo* (F480).

Role: General-purpose. **Builders**: Various, France.
Users: Navies of France and Portugal.
Basic data: 2,250 t full displacement; 337.9 ft (103 m) overall length; 38.7 ft (11.8 m) maximum beam. **Crew**: c.200.
Propulsion: 4 SEMT-Pielstick PCV16 diesels (total 16,000 bhp); 2 propellers.
Sensors: 1 DRBV 22A long-range air search radar; 1 DRBV 50 level air and surface search radar (Portuguese ships only); 1 DRBV 31D (Portuguese) or 32C (French) gun fire control radar; 1 Decca nav radar; 1 DUBA 3 and 1 SQS-17A hull-mounted sonars.
Armament: 4 Exocet anti-ship missile launchers (French ships only); 2 single 100 mm dual-purpose guns (3 in Portuguese ships); 2 single 40 mm anti-aircraft guns; 1 305 mm anti-submarine mortar; 2 triple heavyweight anti-submarine torpedo tubes.
Top speed: 26 kt. **Range**: 4,500 nautical miles at 15 kt.
Programme: Ordered incrementally between 1955 and 1957, the French Navy operate 8 ships of this class. All Lorient-built, these ships and the entry into service dates are: *Commandant Riviere* (F733), *Victor Schoelcher* (F725) and *Admiral Charner* (F727) in 1962; *Doudart De Lagree* (F728) and *Commandant Bourdais* (F740) in 1963; *Commandant Bory* (F740) and *Protet* (F748) in 1964; concluded by *Enseigne De Vaisseau Henry* (F749) in 1965. Ordered in early 1965, the 4 Portuguese ships commissioned between 1967 and 1968 are: *Comandante Joao Belo* (F480), *Comandante Hermegildo Capelo* (F481), *Comandante Roberto Ivens* (F482) and *Comandante Sacadura Cabral* (F483);these being AC de Bretagne built.
Notes: Designed for load carrying capability, rather than speed.

Wielingen class

Frigates



The Royal Belgium Navy ship *Westdiep* (F911).

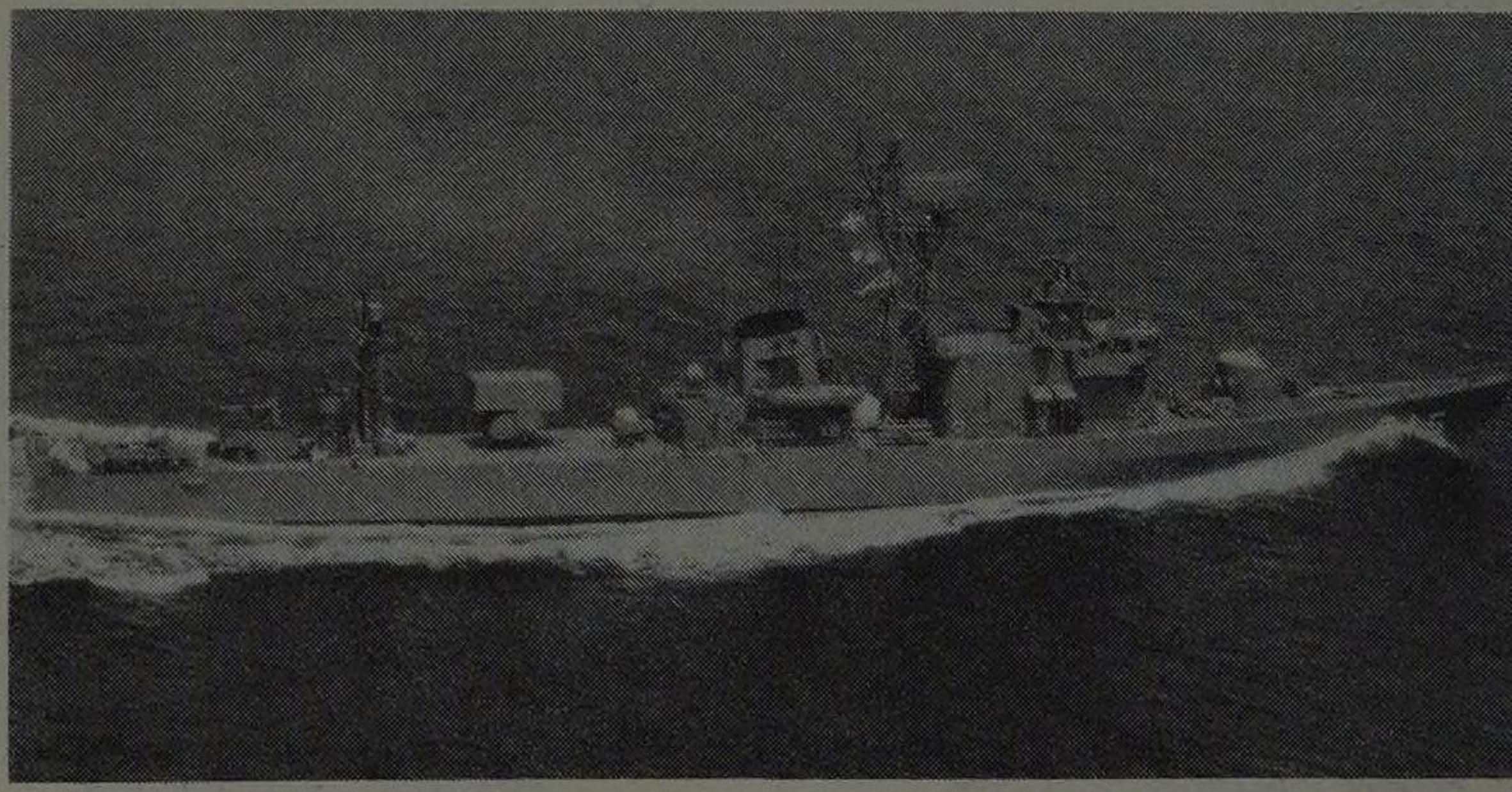
Role: General-purpose.
Builders: Boelwerf & Cockerill, Belgium.
User: Royal Belgium Navy.
Basic data: 2,283 t full displacement; 349 ft (106.4 m) overall length; 40.4 ft (12.3 m) maximum beam. **Crew**: 160.
Propulsion: 1 Rolls-Royce TM3B Olympus gas turbine (28,000 shp) or 2 Cockerill CO-240V-12 diesels (total 6,000 bhp); CODOG; 2 c-p propellers.
Sensors: 1 Hollandse DA 05 combined air and sea search radar; 1 Raytheon TM 1645/9X nav radar; 1 Hollandse WM-25 fire control radar; 1 Canadian SQS-505A hull and towed variable depth sonar; Hollandse SEWACO automated action information data processor.
Armament: 4 Exocet anti-ship missile launchers; 1 single 100 mm dual-purpose gun; 1 octuple Sea Sparrow point air defence missile launcher; 2 single 20 mm anti-aircraft guns; 2 single heavyweight anti-submarine torpedo launchers;1 sextuple 375 mm Bofors anti-submarine rocket launcher.
Top speed: 28 kt. **Range**: 5,000 nautical miles at 14 kt.
Programme: This 4 ship class comprises *Wielingen* (F910), *Westdiep* (F911), *Wandelaar* (F912) and *Westhinder* (F913). Laid down between March 1974 and December 1975, the respective dates of entry into service are: March 1976, June 1977 and October 1978 for the last 2 frigates.
Notes: These vessels have no helicopter facilities and are externally characterised by their low superstructure and massive funnel.

Yarrow Frigate type

HTMS *Makut Rajakumarn* (F7) of Royal Thai Navy, 1973.

Role: General-purpose.
Builder: Yarrow, UK.
User: Royal Thai Navy.
Basic data: 1,900 t full displacement; 320.0 ft (97.56 m) over-all length; 36.0 ft (10.97 m) maximum beam. **Crew**: 140.
Propulsion: 1 Rolls-Royce Olympus gas turbine (28,000 shp) or 1 Crossley SEMT Pielstick 12PC2 diesel (6,000 bhp); 2 c-p propellers.
Sensors: 1 Hollandse WM22 search/fire control radar; 1 Hollandse WM44 fire control radar; 1 Hollandse LWO4 search radar; Decca 625 nav radar; 1 IFF; Plessey MS27 sonar; 1 Type 162 bottom search sonar.
Armament: 2 Vickers 4.5 in Mk 8 guns; 1 quadruple Seacat surface-to-air missile launcher; 2 Bofors 40 mm guns; 1 Limbo anti-submarine mortar; depth charges.
Top speed: 26 kt. **Range**: 4,000 nautical miles at 17 kt.
Programme: The HTMS *Makut Rajakumarn* (F7) was ordered in 1969 and entered service with the Royal Thai Navy in May 1973.
Notes: The *Makut Rajakumarn*, which serves as the flagship of the Royal Thai Navy, is the second of the Yarrow Frigates to be built, the first being the slightly smaller and less heavily armed KD *Rahmat* (F24) for the Royal Malaysian Navy. Unlike the Malaysian ship, the *Makut Rajakumarn* carries a second Vickers 4.5 inch Mk 8 gun aft, in place of the helicopter platform installed aboard the *Rahmat* that was commissioned in March 1971. Both frigates employ a CODOG arrangement for their propulsion, where the ship can be propelled by either gas turbine or diesel, but not by both at once.

Chikugo class

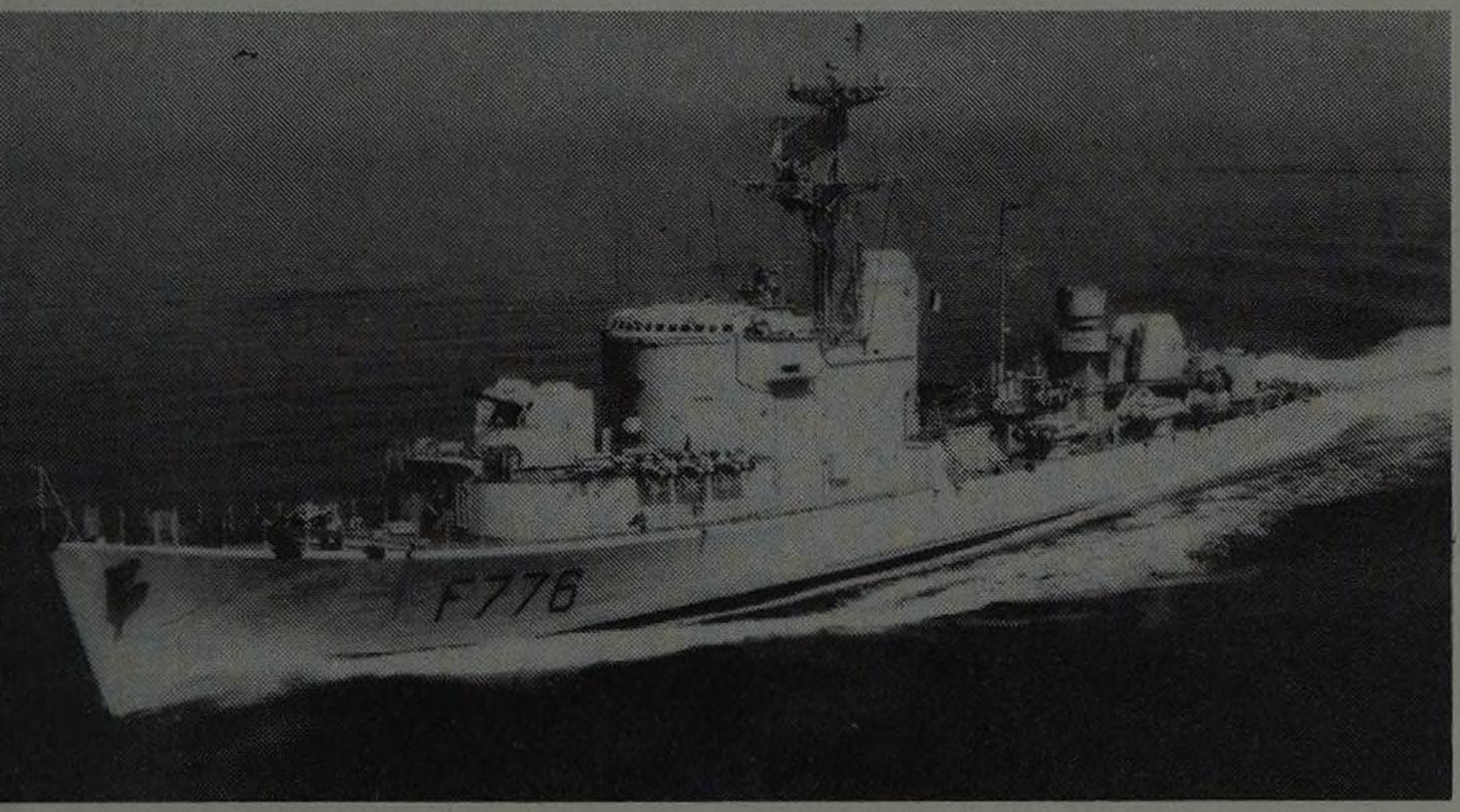


Chikugo (F215) with ASROC launcher aft of funnel.

Role: anti-submarine. **Builders**: Various, Japan.
User: Japanese Maritime Self-Defence Force.
Basic data: 1,800 t full displacement; 305.5 ft (93.1 m) overall length; 35.5 ft (10.8 m) maximum beam. **Crew**: 165.
Propulsion: 4 Mitsui diesels (total 16,000 bhp); 2 propellers.
Sensors: OPS-14 air search radar; 1 OPS-17 surface search radar; 1 GFCS-1 fire control radar; 1 OQS-3 hull-mounted sonar; 1 SPS-35J variable depth sonar.
Armament: 1 twin 76 mm dual-purpose gun; 1 twin 40 mm anti-aircraft gun; 1 octuple ASROC anti-submarine missile launcher; 2 triple lightweight anti-submarine torpedo tubes.
Top speed: 25 kt. **Range**: Not published.
Programme: Mitsui acted as lead yard for this 11 ship class, all of which were delivered between July 1970 and August 1977. The ships and their acceptance dates comprise: *Chikugo* (F215), July 1970; *Ayase* (F216), July 1971; *Mikumo* (F217), August 1971; *Tokachi* (F218), May 1972; *Iwase* (F219), December 1972; *Chitose* (F220), August 1973; *Niyodo* (F221), February 1974; *Teshio* (F222), January 1975; *Yoshino* (F223), February 1975; *Kumano* (F224), November 1975; and *Noshiro* (F225), August 1977. F215, F217, F218, F219, F223 and F225 were built by Mitsui; F220, F222 and F224 by Hitachi, while F216 was constructed by Ishikawajima.
Notes: Speed and endurance are clearly subordinated to sensor and weaponry in these clean, unclustered light frigates.

L'Alsacien class

Frigates

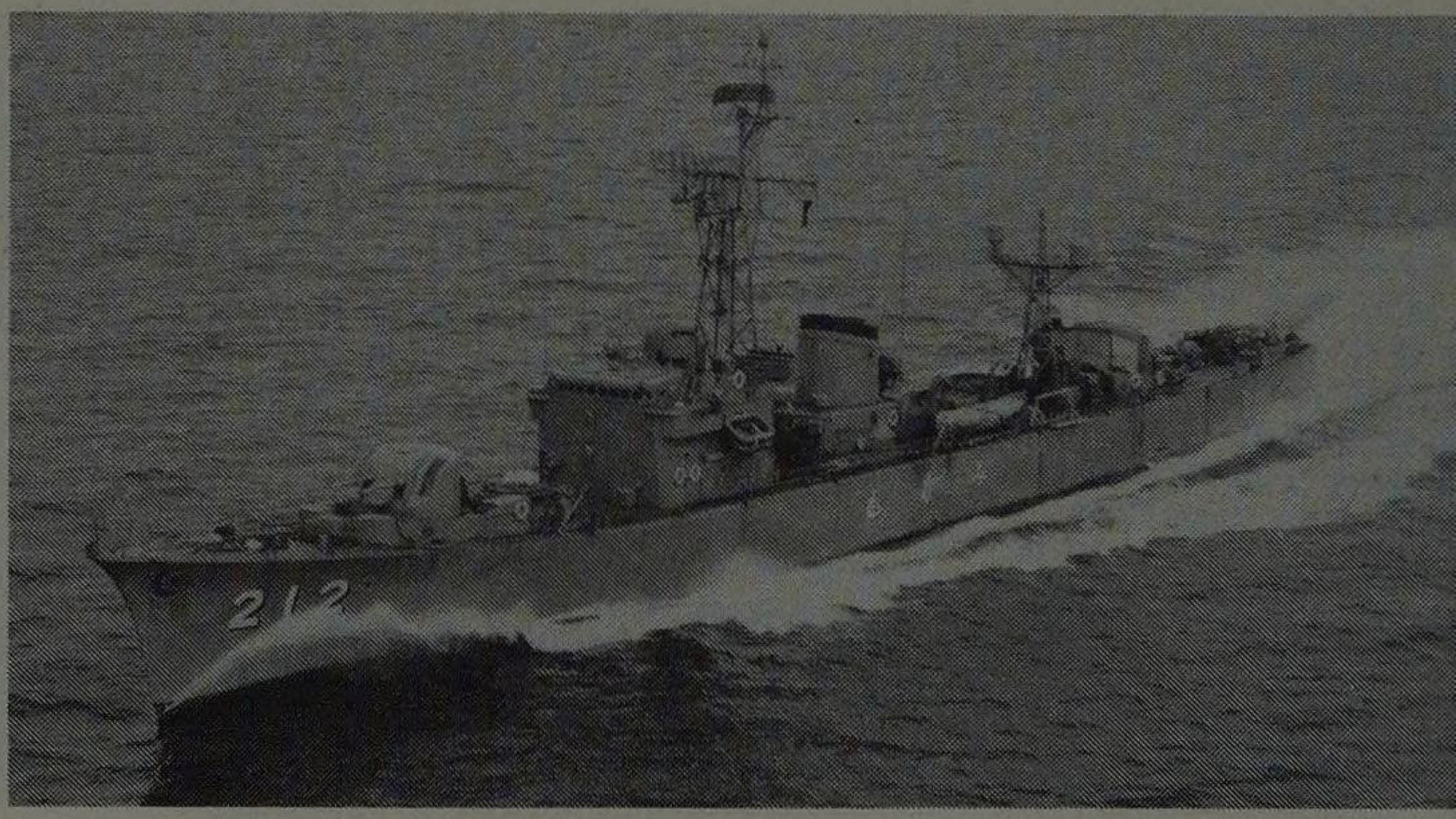


L'Alsacien (F776) in the Mediterranean.

Role: Anti-submarine. **Builders**: Lorient & F.C.M., France.
User: French Navy.
Basic data: 1,700 t full displacement; 327.4 ft (99.8 m) overall length; 33.8 ft (10.3 m) maximum beam. **Crew**: 171.
Propulsion: 2 Parsons or Rateau geared steam turbines (total 20,000 shp); 2 propellers.
Sensors: 1 DRBV 22A long-range air search radar; 1 DRBV 31 nav radar; 1 DRBC 32 gun fire control radar; 1 DUBV 24 hull-mounted sonar; 1 DUBV 1 hull-mounted sonar.
Armament: 2 twin 57 mm anti-aircraft guns; 1 twin 20 mm anti-aircraft gun; 4 triple heavyweight anti-submarine torpedo tubes; 1 quadruple 305 mm anti-submarine mortar.
Top speed: 27 kt. **Range**: 4,500 nautical miles at 15 kt.
Programme: *L'Alsacien* (F776), *Le Provencal* (F777) and *Le Vendeen* (F778), sometimes referred to as Type E 52B, along with 2 remaining Type E 52As, are all that still serve of what was an original 12 ship class built around the mid-1950s. The 3 existing L'Alsaciens entered service between November 1959 and October 1960, with F776 and F777 being built by Lorient and F778 by F.C. de la Méditerranée.
Notes: Typifying the French Navy former preference for ships designed to meet a specific role, these elderly frigates are in the process of being retired, to be replaced by more truly multi-purpose vessels, such as the D'Estienne D'Orves class corvettes.

Isuzu class

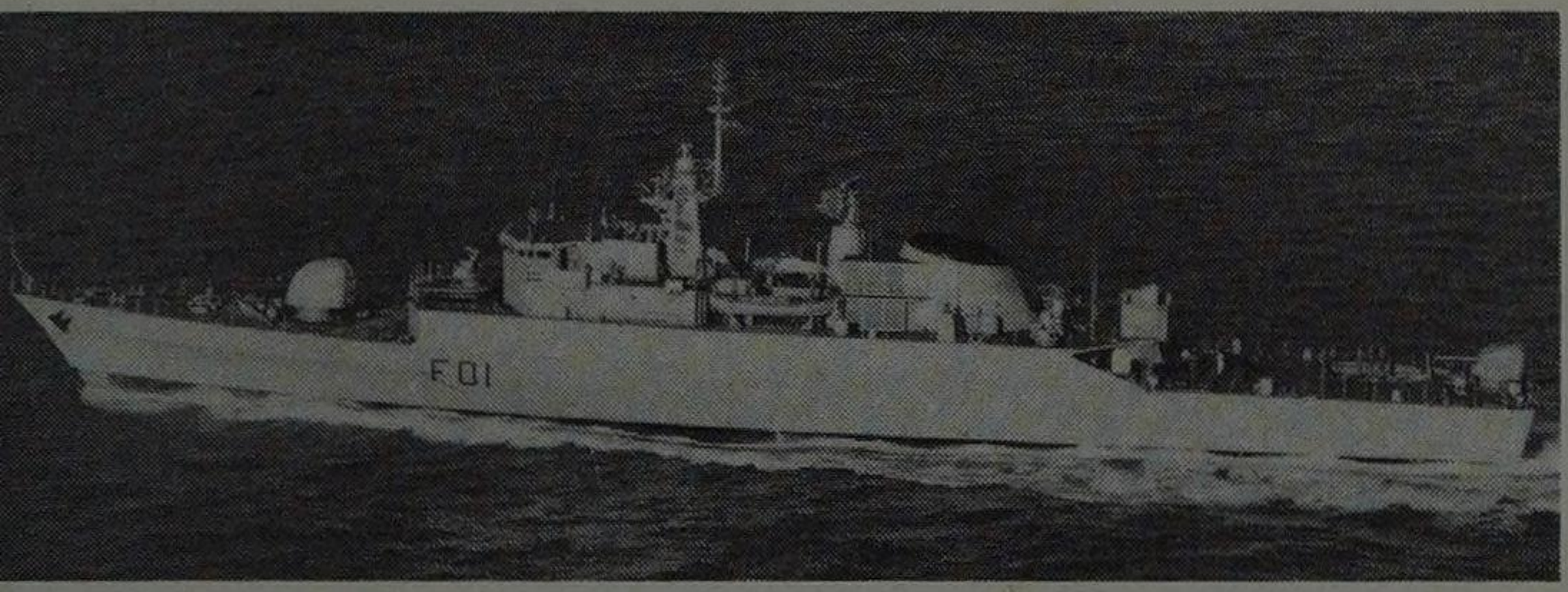
Frigates



Mogami (F212), an Isuzu class anti-submarine frigate.

Role: Anti-submarine. **Builders**: Various, Japan.
User: Japanese Maritime Self-Defence Force.
Basic data: 1,790 t full displacement; 308.4 ft (94 m) overall length; 34.1 ft (10.4 m) maximum beam. **Crew**: 180.
Propulsion: 2 or 4 diesels of various make (total 16,000 bhp); 2 propellers.
Sensors: 1 OPS-16 air search radar; 1 OPS-1 surface search radar; 2 Mk 34 gun fire control radars; 1 OQS 12 or 14 hull-mounted sonar. Note: F212 and F213 have 1 OQA1 variable depth sonar.
Armament: 2 twin 76 mm dual-purpose guns; 1 quadruple 375 mm Bofors anti-submarine rocket launcher. Note: F213 and F214 have 2 triple lightweight anti-submarine torpedo tubes; 1 depth charge projector (not fitted to F212 and F213).
Top speed: 25 kt. **Range**: In excess of 6,000 nautical miles.
Programme: This 4 ship class was laid down between April 1960 and June 1962 in 4 separate shipyards and comprises *Isuzu* (F211), *Mogami* (F212), *Kitakami* (F213) and *Ohi* (F214). The respective dates for the ships' entry into service were July 1961, October 1961, February 1964 and January 1964. This class is scheduled to be phased out within the next few years.
Notes: Designed as economic light escorts, the armament of this class is weak even in modern day anti-submarine terms.

Dat Assawari type (Mk 7) Frigates

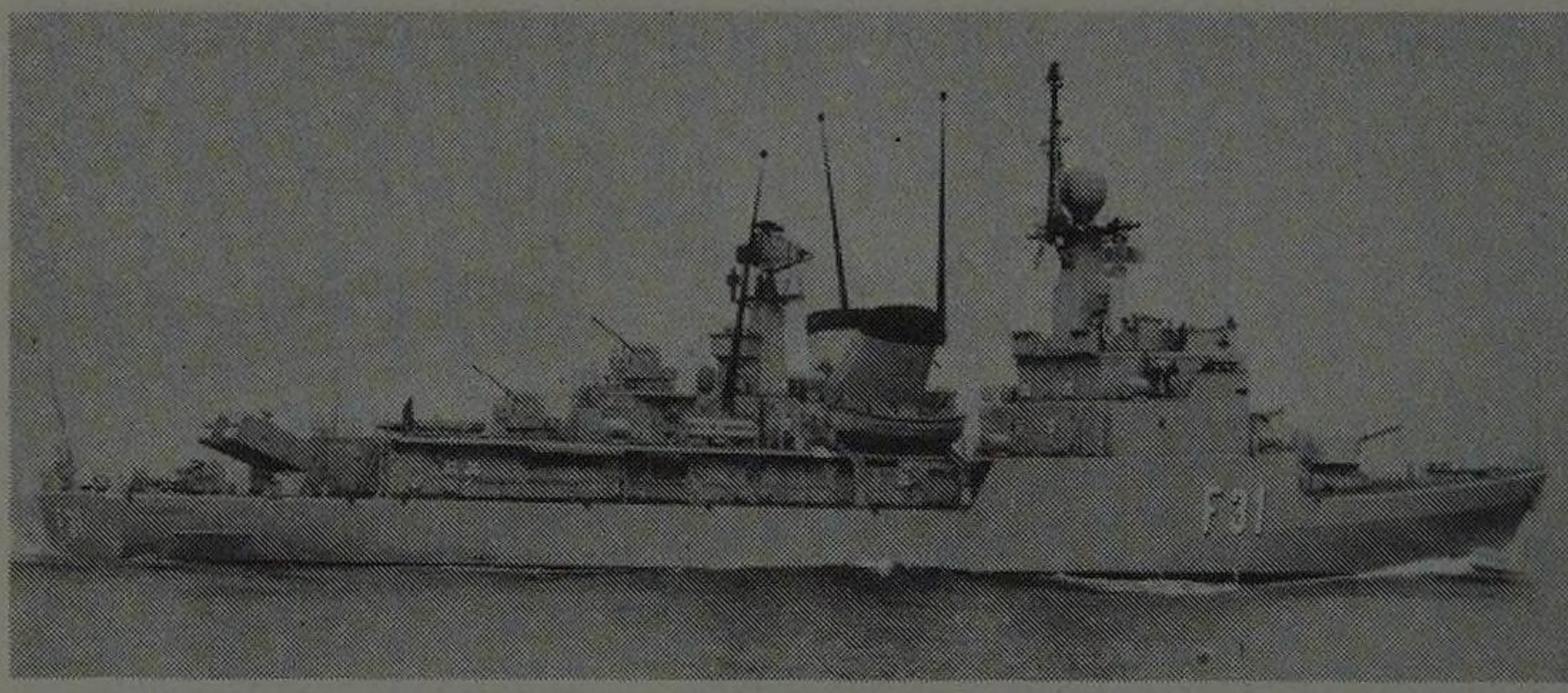


Dat Assawari (F211) prior to recent modernisation.

Role: General-purpose. **Builder**: Vosper Thornycroft, UK.
User: Libyan Navy.
Basic data: 1,800 t full displacement; 333 ft (101.6 m) overall length; 38.3 ft (11.7 m) maximum beam. **Crew**: 128.
Propulsion: 2 Rolls-Royce T3MA gas turbines (total 48,000 shp) or 2 Paxman 16 YJCM diesels (total 3,800 bhp); CODOG; 2 c-p propellers.
Sensors: 1 Plessey AWS-1 long-range air search radar; 1 Decca 629 nav radar; 2 Contraves Sea Hunter fire control radars; 1 Type 162, 1 Type 170 and 1 Type 174 hull-mounted sonars. (Note: this is the original sensor fit as installed by the builders, see **Notes**.)
Armament: 1 single 4.5 inch Vickers Mk 8 dual-purpose gun; 1 triple Seacat point air defence missile launcher; 1 twin 35 mm anti-aircraft gun; 2 single 40 mm anti-aircraft guns both Oerlikon; 1 triple Mk 10 Limbo anti-submarine mortar. (Original fit equipment, see **Notes** below.)
Top speed: 36 kt. **Range**: 6,000 nautical miles at 16 kt.
Programme: This single ship was ordered in 1968, laid down in September of that year, launched in September 1969 and accepted into service in February 1973. *Dat Assawari* carried the original pennant number of FO1, but this had been changed to F211.
Notes: This ship's fighting capabilities have been significantly increased during its 1979/80 refit carried out in Italy, which involved replacement of Seacat and Limbo by quadruple Aspide and 2 triple torpedo tubes, plus the addition of 4 Otomat point air defence missiles. New Italian search and fire control radars have been fitted.

Descubierta class

Frigates



The Spanish Navy's *Descubierta* (F31), photographed in 1978.

Role: General-purpose.
Builder: Bazan, Spain.
Users: Spanish and Egyptian Navies.
Basic data: 1,520 t full displacement; 291.6 ft (88.88 m) overall length; 34.1 ft (10.4 m) maximum beam. **Crew**: 148.
Propulsion: 4 MTU-Bazan 16V956 TB91 diesels (total 16,000 bhp); 2 c-p propellers.
Sensors: 1 Hollandse DA-05/2 air/sea search radar; 1 Hollandse ZW-06 surface search/nav radar; 1 Hollandse WM-22 fire control radar; 1 Raytheon 1160B hull-mounted sonar; 1 Raytheon 1167 towed variable depth sonar.
Armament: Quadruple Harpoon anti-ship missile launchers; 1 octuple Sea Sparrow point air defence missile launcher; 1 OTO-Melara 76 mm dual-purpose gun; 2 single 40 mm anti-aircraft guns (to be replaced by 1 Meroka multiple-barrelled 20 mm close-in air defence system); 1 twin 375 mm Bofors anti-submarine rocket launcher; 2 triple lightweight anti-submarine torpedo tubes.
Top speed: 26 kt. **Range**: 6,100 nautical miles at 18 kt.
Programme: An 8 ship class ordered in 2 batches of 4 each in 1973 and 1976, respectively, comprising: *Descubierta* (F31), *Diana* (F32), *Infanta Elena* (F33), *Infanta Christina* (F34), *Cadazora* (F35), *Vencedora* (F36), *Centinella* (F37) and *Serviola* (F38). Launched between 1975–80 they entered service between 1978–82, to be followed by 4 Improved Descubierta class. Egypt ordered 2 more in mid-1982.
Notes: Characterised by the vee-shaped funnel, topped by thick aerials, these ships have a heavy, well-balanced armament.

Fatahillah class

Corvettes

Nala (F363), unique in having helicopter pad aft.

Role: General-purpose.
User: Indonesian Navy.
Builder: RSV, Netherlands.
Basic data: 1,450 t full displacement; 275.1 ft (83.85 m) overall length; 36.4 ft (11.1 m) maximum beam. **Crew**: 82.
Propulsion: 1 Rolls-Royce TM3B Olympus (28,000 shp) or 2 MTU 16V 956 TB91 diesels (total 4,400 bhp); CODOG; 2 c-p propellers.
Sensors: 1 Hollandse DA-05 search radar; 1 Decca AC 1229 nav radar; 1 Hollandse WM25 fire control radar; 1 Van der Heem PHS-32 hull-mounted sonar; Hollandse automated action information.
Armament: 4 Exocet anti-ship missile launchers; 1 Bofors 120 mm gun; 1 Bofors 20 mm anti-aircraft gun; 1 Bofors twin-barrel 375 mm anti-submarine rocket launcher; 2 triple light-weight anti-submarine torpedo tubes. *Nala* only has facilities and hangar for helicopter.
Top speed: 30 kt. **Range**: 4,250 nautical miles at 16 kt.
Programme: Ordered in August 1975, this 3 ship class comprises *Fatahillah* (F361), *Malahayati* (F362) and *Nala* (F363), all laid down between January 1977 through January 1978 and commissioned between July 1979 and summer 1980.
Notes: Effectively the flagships of the Indonesian Navy, these modern, compact, well-armed corvettes demonstrate, once more, the recent strides made in cramming more weaponry into the minimum hull size. To illustrate this point it is interesting to compare the weaponry/sensor package of these ships with that of the Royal Navy's 3,250 ton Amazons designed a decade earlier.

Joao Coutinho class

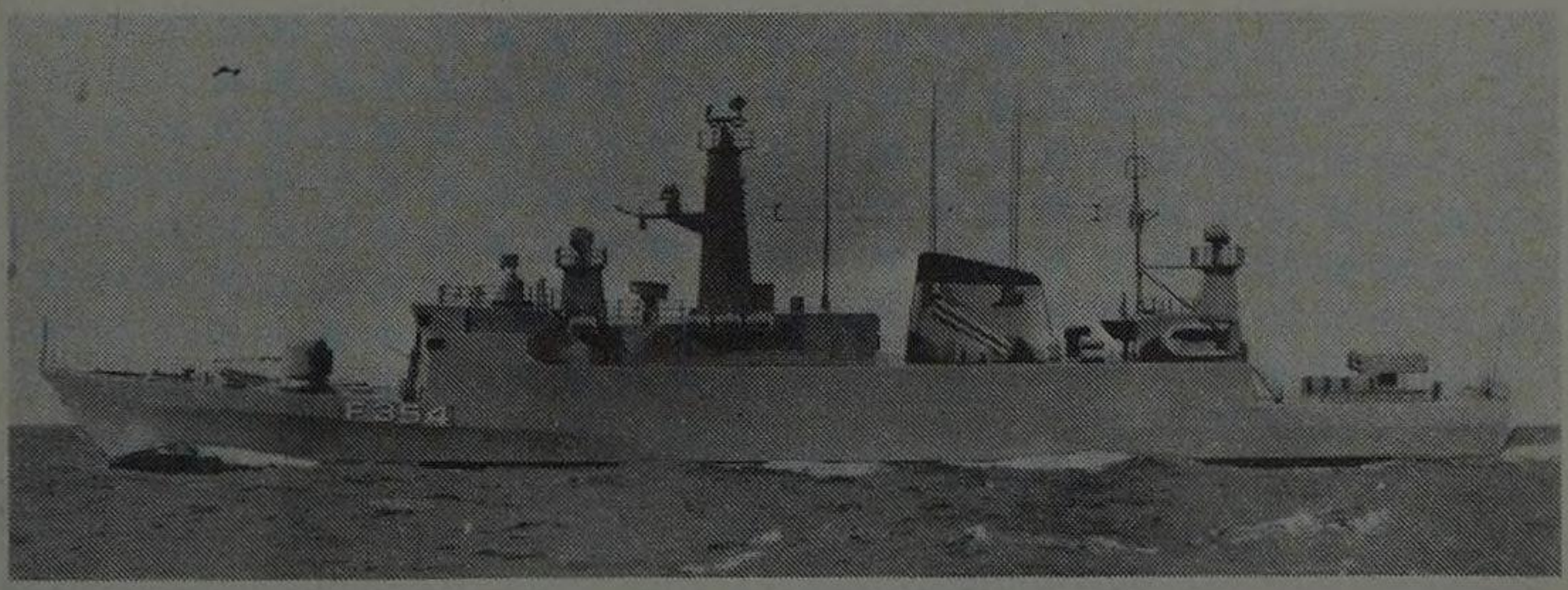
Corvettes

Joao Coutinho (F475) with elevated helicopter pad aft.

Role: Anti-submarine. **User**: Portuguese Navy.
Builders: Blohm und Voss, Federal Germany, and Bazan, Spain.
Basic data: 1,400 t full displacement; 277.6 ft (84.6 m) overall length; 33.8 ft (10.3 m) maximum beam. **Crew**: 100.
Propulsion: 2 OEW-Pielstick 12PC2V diesels (total 10,560 bhp); 2 propellers.
Sensors: 1 MLA 1B air and sea search radar; 1 Decca TM 625 nav radar; 1 SPG-50 fire control radar; 1 QCU 2 hull-mounted sonar.
Armament: 1 twin 76 mm Mk 33 dual-purpose gun; 1 twin Bofors 40 mm anti-aircraft gun; 1 Mk 10 Hedgehog and 2 Mk 6 depth charge projectors; aft helicopter pad, but no onboard facilities.
Top speed: 24 kt. **Range**: 5,900 nautical miles at 18 kt.
Programme: This 6 ship class, ordered in 1967, consisted of 2 batches of 3 each, the lead batch being Blohm und Voss built, while the last 3 were constructed in the Spanish shipyards of Bazan. Blohm und Voss built *Joao Coutinho* (F475), *Jacinto Candido* (F476) and *General Pereira D'eca* (F477) and Bazan completed *Augusto Castilho* (F484), *Honorio Barreto* (F485) and *Antonio Enes* (F471). The respective service entry dates for these corvettes were: March 1970, June 1970, October 1970 November 1970, April 1971 and June 1971.
Notes: Designed to operate across the range of climatic conditions, their rather poor armament was quite adequate for Portugal's then colonial needs. These were West Germany's first post-World War II warships to be exported.

Niels Juel class

Corvettes



Niels Juel (F354).

Role: Anti-shipping. **Builder**: Aalborg Vaerft, Denmark.
User: Royal Danish Navy.
Basic data: 1,320 t full displacement; 273.55 ft (84 m) overall length; 32.85 ft (10.3 m) maximum beam. **Crew**: 90.
Propulsion: 1 General Electric LM2500 gas turbine (27,400 shp) or 1 MTU 20V-956 diesel (4,800 bhp); CODOG; 2 propellers.
Sensors: 1 Plessey AWS5 search radar; 1 Philips (Sweden) 9LV200 fire control radar; 1 B & W Scanter nav radar; 2 Raytheon EX-77 fire control radars; 1 Plessey PMS-26 hull-mounted sonar; DATA-SAAB automated action information data processor.
Armament: 2 quadruple Harpoon anti-ship missile launchers; 1 OTO-Melara 76 mm dual-purpose gun; single 8 cell Sea Sparrow short-range air defence missile launcher.
Top speed: 28 kt. **Range**: 2,500 nautical miles at 18 kt.
Programme: These 3 YARD of Glasgow designed KV72 corvettes were ordered in 1975. The lead ship, *Niels Juel* (F354), was laid down in October 1976, launched in September 1978 and commissioned into service in August 1980. Both laid down during 1977, the other 2 of the class, *Olfert Fischer* (F355) and *Peter Tordenskjold* (F356), were commissioned simultaneously on 7 September 1981.
Notes: Built to replace 4 gun-only equipped Triton class (Danish name for the Italian-designed 800 ton Albatros class corvettes), these Niels Juel class vessels, although not yet so equipped, were designed from the outset to accept internally launched anti-submarine torpedoes and to mount a close-in air defence missile system.

D'Estienne D'Orves class

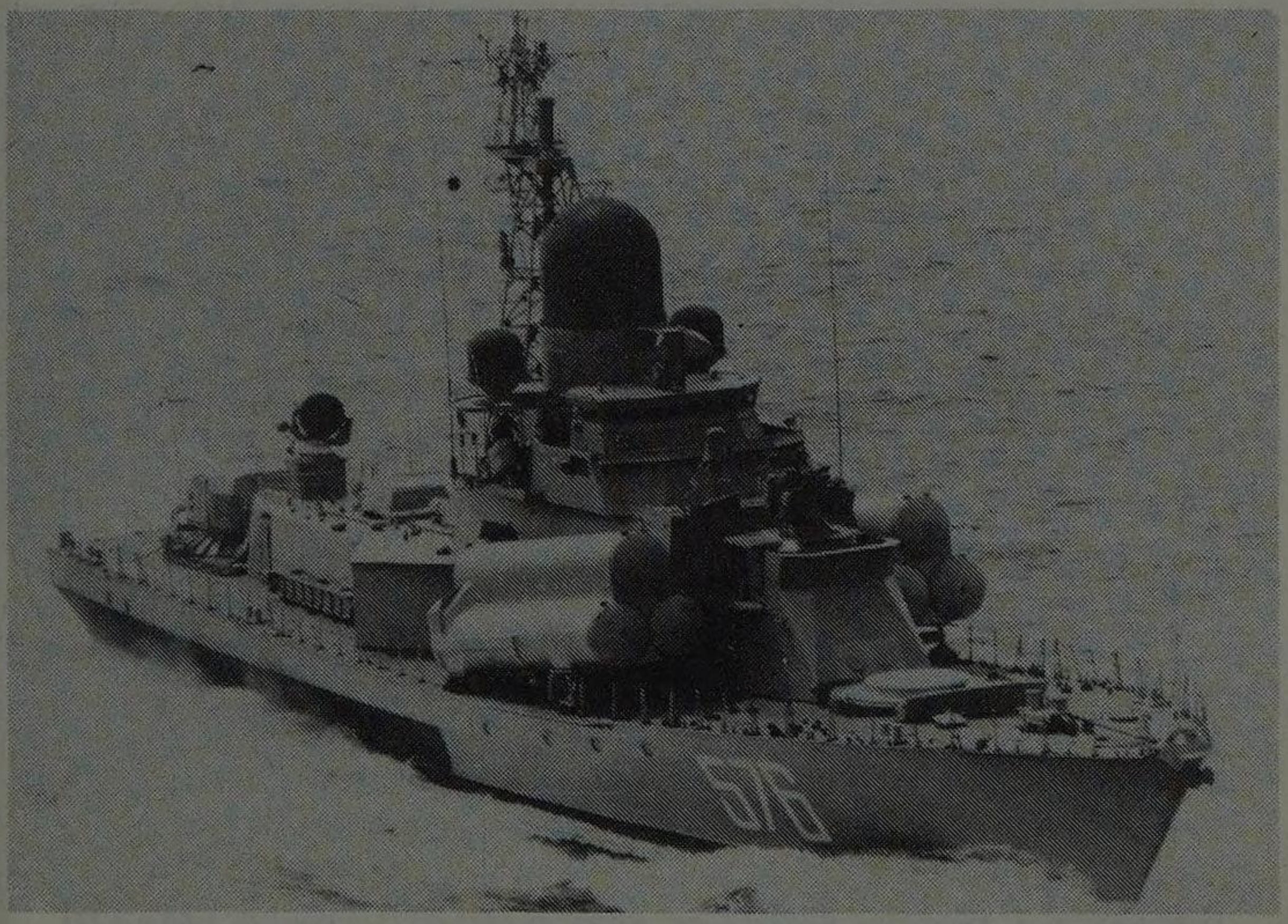
Corvettes

French Navy's *Quartier Maitre Anquetil* (F786), 1978.

Role: Anti-submarine. **Builder**: DCAN Lorient, France.
Users: French and Argentinian Navies.
Basic data: 1,250 t full displacement; 262.5 ft (80 m) overall length; 33.8 ft (10.3 m) maximum beam. **Crew**: 75.
Propulsion: 2 SEMT Pielstick 12 PC2 diesels (total 12,000 bhp); 2 c-p propellers.
Sensors: 1 DRBV 51 search radar; 1 DRBC 32 fire control radar; 1 Decca 1228 (DBBN 32) nav radar; 1 DUBA 25 sonar (Diodin in Argentinian vessels).
Armament: 2 Exocet anti-ship missile launchers; 1 single 100 mm Model dual-purpose gun; 1 sextuple Bofors 375 mm anti-submarine rocket launcher (1 Bofors 40 mm anti-aircraft gun on Argentinian ships only); 1 twin Oerlikon 20 mm anti-aircraft gun; 2 triple lightweight anti-submarine torpedo tubes.
Top speed: 23.5 kt. **Range**: 4,500 nautical miles at 15 kt.
Programme: Originally planned as a 14 ship class, the Type A69 (A stands for Aviso, or light frigate/corvette) build has been expanded to include at least a 15th vessel for France and 3 for Argentina, where the type is known as the **Drummond class**. The French vessels, F781 through F795, commenced entering French naval service in September 1976 with *D'Estienne D'Orves* (F781). As a result of delivering all 3 Drummond class ships, F701 through F703, to Argentina by 1981, deliveries of later French vessels have been rescheduled and are as yet incomplete.
Notes: Designed with economy of operation uppermost in mind.

Nanuchka I/II/III classes

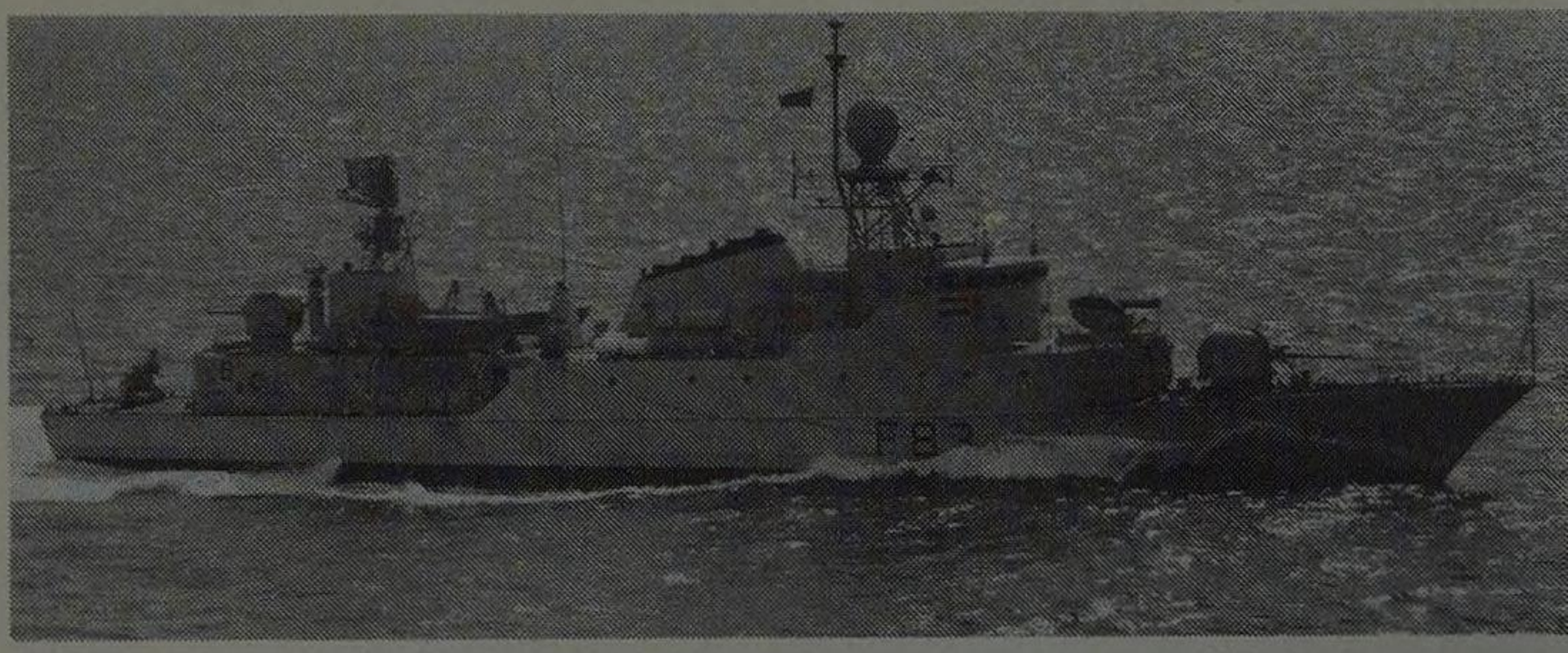
Corvettes



A Soviet Navy anti-ship missile equipped Nanuchka I.

Role: Anti-shipping.
Builder: Petrovskiy, USSR.
Users: Soviet and Indian Navies.
Basic data: 950 t full displacement; 229 ft (69.8 m) overall length; 40 ft (12.2 m) maximum beam.
Crew: 60.
Propulsion: 6 diesels (total 30,000 bhp); 3 propellers.
Sensors: 1 air search radar; 1 surface search and nav radar; 1 IFF; 3 separate fire control radar systems.
Armament: 2 triple SS-N-9 anti-ship missile launchers; 1 twin SA-N-4 point air defence missile launcher; 1 twin 57 mm anti-aircraft guns in Nanuchka I and IIs, or 1 single 76 mm and 1 30 mm Gatling-type anti-aircraft guns on Nanuchka IIIs. Export Nanuchka IIs carry only 4 SS-N-2C STYX missiles.
Top speed: 34 kt.
Range: Not known.
Programme: Construction of the Nanuchka class commenced in 1969. The Soviet Navy operate a known 18 ship class and 3 more of these vessels were delivered as Nanuchka IIs to the Indian Navy during 1977–8.
Notes: Designed for improved sea-keeping and greater endurance when compared with the earlier Soviet missile boats.

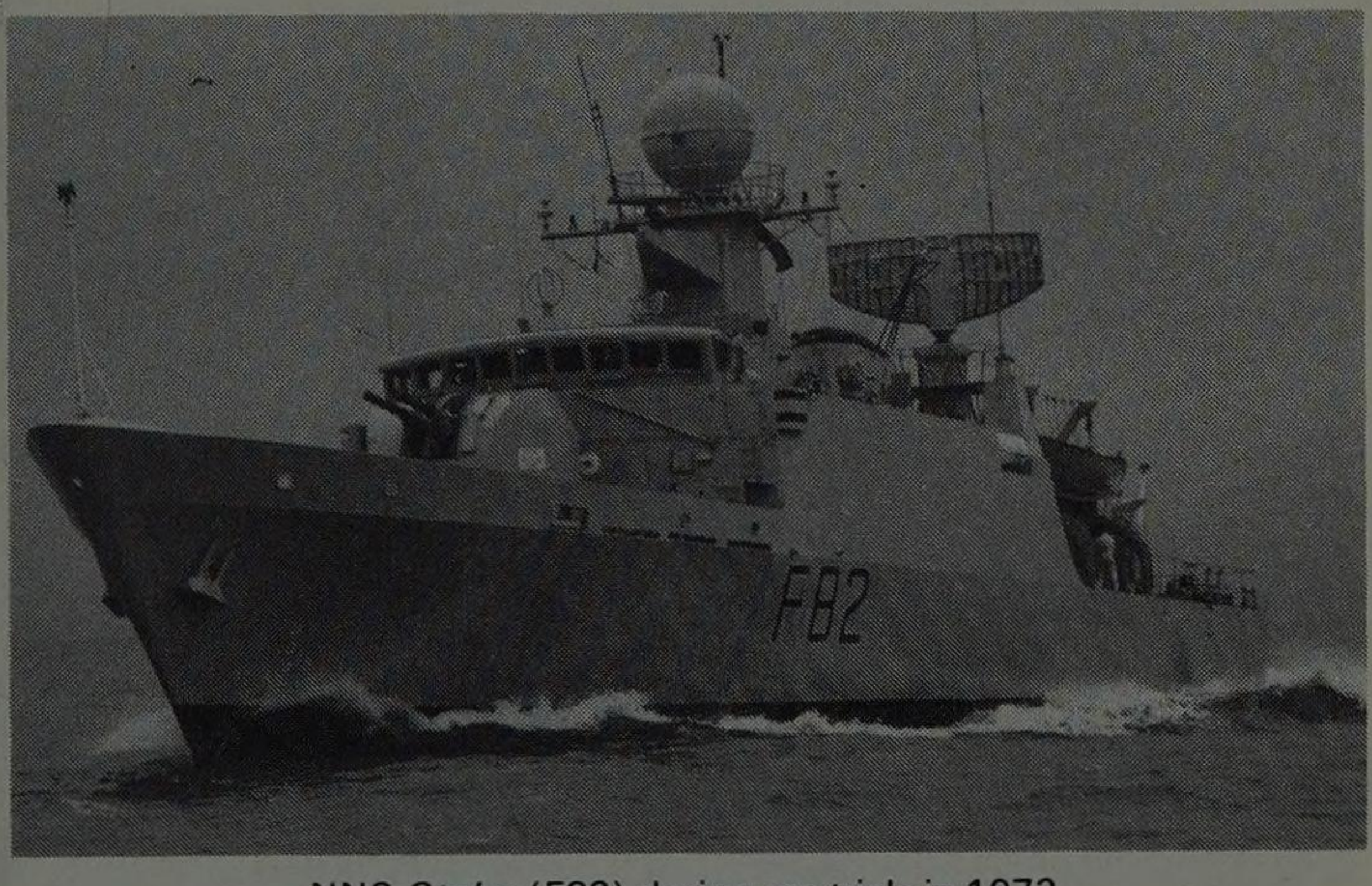
Hippo class (Mk 9) Corvettes



NNS *Erinomi* (F83) in the English Channel, 1979.

Role: General-purpose. **Builder**: Vosper Thornycroft, UK.
User: Nigerian Navy.
Basic data: 850 t full displacement; 226 ft (69 m) overall length; 31.5 ft (9.6 m) maximum beam. **Crew**: 90.
Propulsion: 4 MTU 20V 956 diesels (total 20,512 bhp); 2 c-p propellers.
Sensors: 1 Plessey AWS2 air search radar; 1 Decca TM1226 nav radar; 1 Hollandse WM24 fire control radar; 1 Plessey PMS 26 sonar.
Armament: 1 OTO-Melara 76 mm dual-purpose gun; 1 Bofors 40 mm gun; 2 Oerlikon 20 mm anti-aircraft guns; 1 triple Seacat short-range air defence missile launcher; 1 Bofors twin 375 mm anti-submarine rocket launcher.
Top speed: 27 kt. **Range**: 2,200 nautical miles at 14 kt.
Programme: The two Mark 9 Hippo class corvettes, NNS *Erinomi* (F83) and NNS *Emyimiri* (F84), were ordered by the Nigerian Government in April 1975 as heavier, more powerful follow-ons to the earlier Mk 3s. Laid down in October 1975, *Erinomi* was launched in January 1977 and entered service in December 1979, while the *Enyimiri* was commenced in February 1977, launched in February 1978 and accepted in May 1980.
Notes: Somewhat confusingly grouped along with the earlier Mark 3s under the one Hippo class designation, the two Mark 9s provide yet another instance of the operational pressures acting on shipbuilders to design ever larger vessels to meet expanding mission needs, in this case an added anti-submarine capability. Compare with the Mark 3 on the next page.

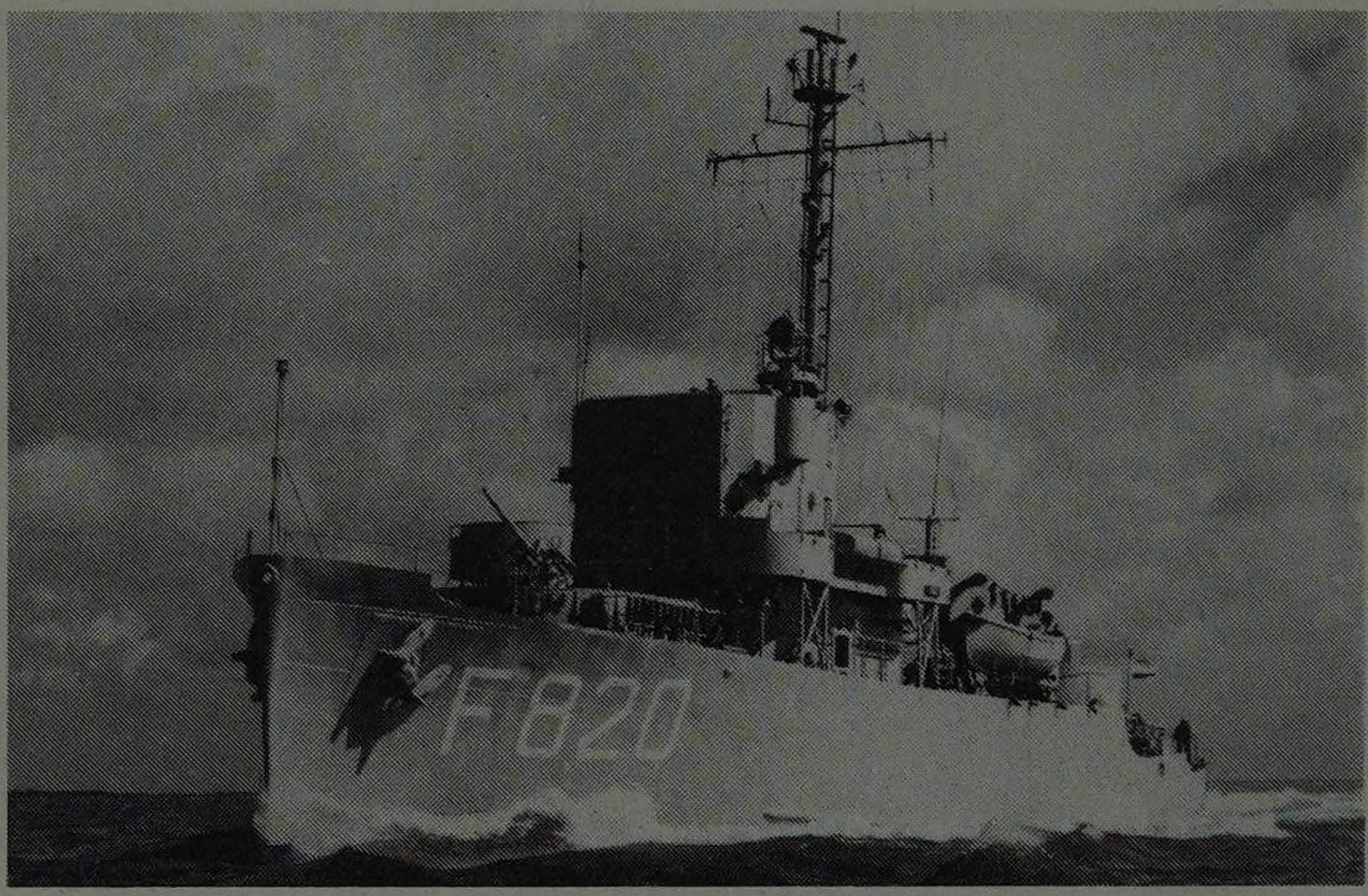
Hippo class (Mk 3) Corvettes



NNS *Otobo* (F82) during sea trials in 1972.

Role: Anti-shipping. **Builder**: Vosper Thornycroft, UK.
User: Nigerian Navy.
Basic data: 650 t full displacement; 200 ft (61.57 m) overall length; 30.85 ft (9.4 m) maximum beam. **Crew**: 67.
Propulsion: 2 MAN V8V 24/30B diesels (total 8,860 bhp); 2 propellers.
Sensors: 1 Plessey AWS1 air search radar; 1 Decca TM 626 nav radar; 1 Hollandse M22 fire control radar; 1 Plessey sonar.
Armament: 1 twin 4 in Mk 19 dual-purpose gun; 2 Bofors 40 mm anti-aircraft guns; 2 Oerlikon 20 mm anti-aircraft guns.
Top speed: 22 kt. **Range**: 3,000 nautical miles at 14 kt.
Programme: In 1968, the Nigerian Government ordered two Mark 3 corvettes from Vosper Thornycroft, the vessels being NNS *Dorina* (F81) and NNS *Otobo* (F82). *Dorina* was laid down in January 1970, launched in September 1970 and accepted in June 1972, while *Otobo's* keel was laid in September 1970, launched in May 1971 and joined the Nigerian Navy in November 1972. Refitted by Vosper Thornycroft in 1976/7.
Notes: Ships' sonar retrofitted in 1976–77.

Wolf class Corvettes

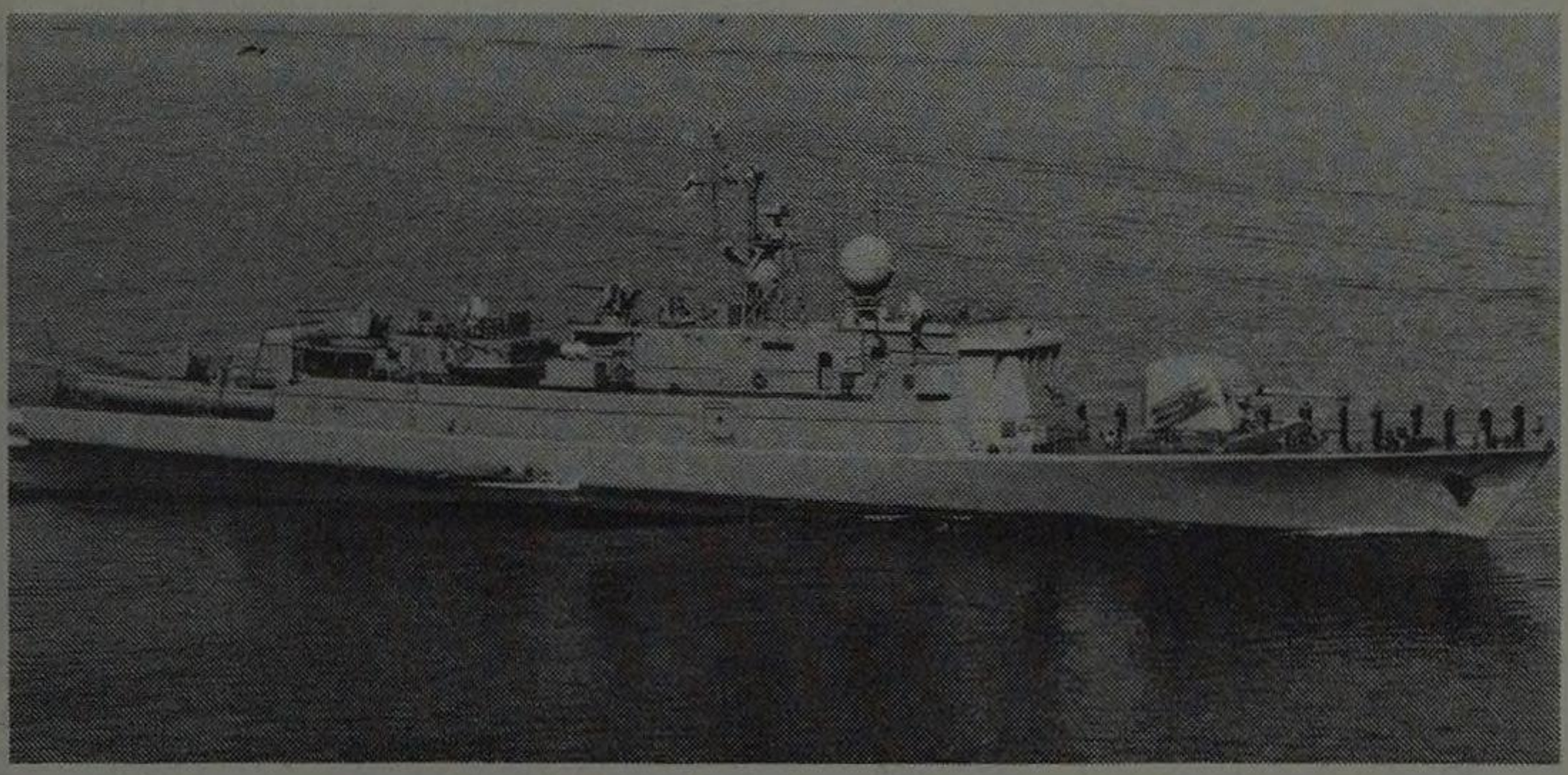


The Wolf class corvette HNLMS *Vos* (F820).

Role: Anti-submarine. **Builders**: Various, USA.
User: Royal Netherlands Navy.
Basic data: 808 t full displacement; 184.7 ft (56.27 m) overall length; 33.8 ft (10.3 m) maximum beam. **Crew**: 80.
Propulsion: 2 General Motors 12-567 ATL diesels (total 1,800 bhp); 2 propellers.
Sensors: 1 Decca 1229 nav radar; 1 QCU 2 hull-mounted sonar.
Armament: 1 single 76 mm Mk 22 dual-purpose gun; 3 twin 40 mm anti-aircraft guns; 1 Mk 10 Hedgehog submarine mortar; 4 anti-submarine depth charge launchers; 2 depth charge racks.
Top speed: 15 kt. **Range**: 9,000 nautical miles at 10 kt.
Programme: Previously known as the Roofdier class, these 6 ships all entered service during 1954 and comprise: HNLMS *Wolf* (F817), HNLMS *Fret* (F818), HLMNS *Hermelijn* (F819), HNLMS *Vos* (F820), HNLMS *Panter* (F821) and HNLMS *Jaguar* (F822). The Wolf class is to be replaced during the 1980s by the new and larger Dutch 'M' type frigates.
Notes: Designed as convoy escorts, the primary current task of these elderly vessels is to provide fishery protection.

Turunmaa class

Corvettes

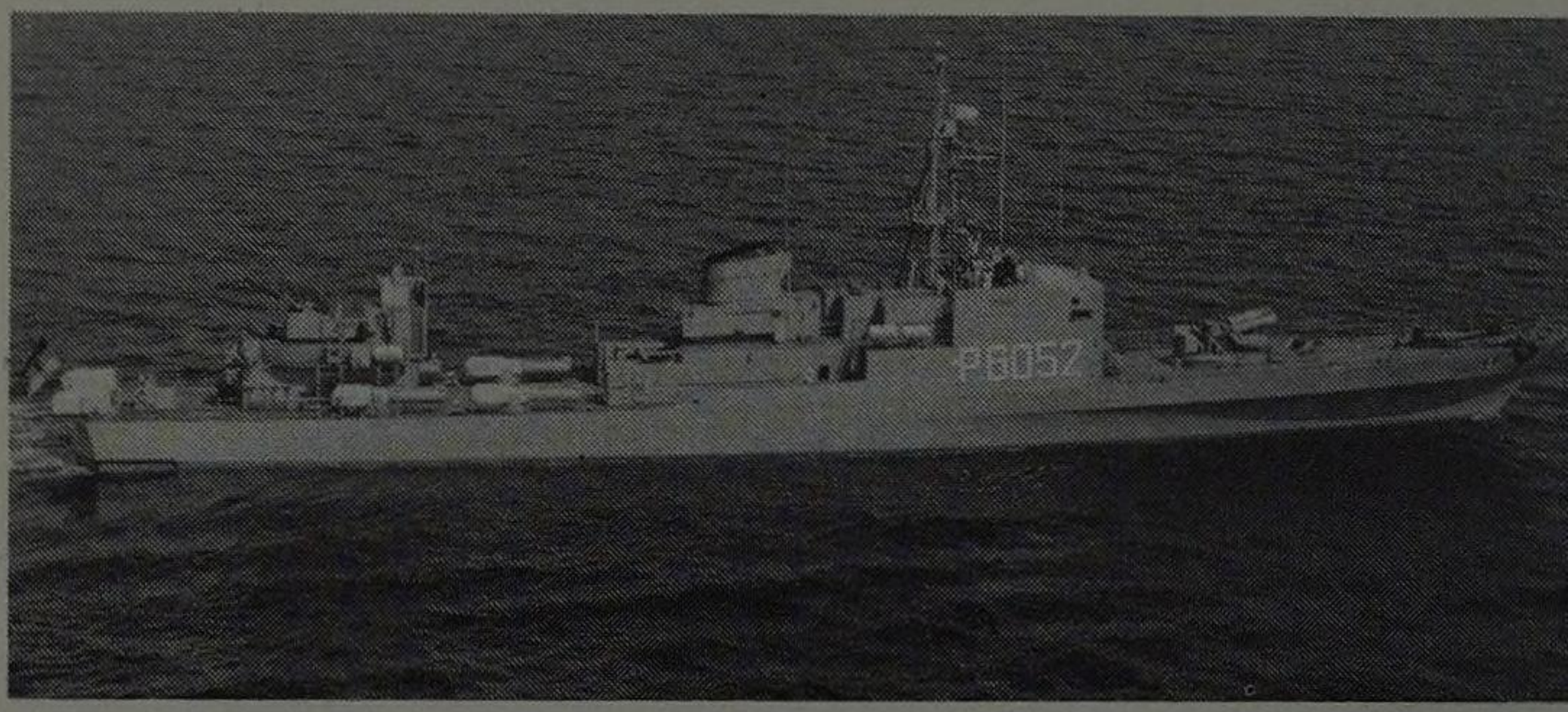


Finland's impressively armed *Turunmaa* corvette.

Role: General-purpose. **Builder**: Wartsila, Finland.
User: Finnish Naval Forces.
Basic data: 770 t full displacement; 243.1 ft (74.1) m) overall length; 25.6 ft (7.8 m) maximum beam. **Crew**: 70.
Propulsion: 1 Rolls-Royce TM3B Olympus gas turbine (de-rated to 22,000 shp) or 3 MTU diesels (total 8,790 bhp); CODOG; 3 propellers.
Sensors: 1 Hollandse WM22 combined air/sea search and fire control radar; 1 nav radar.
Armament: 1 Bofors 120 mm automatic dual-purpose gun; 2 single Bofors 40 mm anti-aircraft guns; 1 twin 30 mm anti-aircraft gun; 2 RBU-1200 five-barrel 250 mm anti-submarine rocket launchers (internally-mounted behind amidships main-deck doors); 2 depth charge racks.
Top speed: 35 kt. **Range**: 2,500 nautical miles at 14 kt.
Programme: The 2 ship Turunmaa class were both laid down in March 1967. The *Turunmaa* and *Karjala* launching occurred in the July and August of 1967 and they entered service in August and October 1968, respectively.
Notes: Long, low-profiled, angular boats, the Turunmaa class's 120 mm primary armament can fire up to 80 rounds per minute and elevate its barrel up to angles of 80 degrees. The gun can fire its 77.5 lbs (35 kg) shells at surface targets out to an effective maximum range of nearly 6.5 nautical miles (12,000 m). The ships have a well-balanced anti-ship, anti-air and anti-submarine capability.

Thetis class

Corvettes

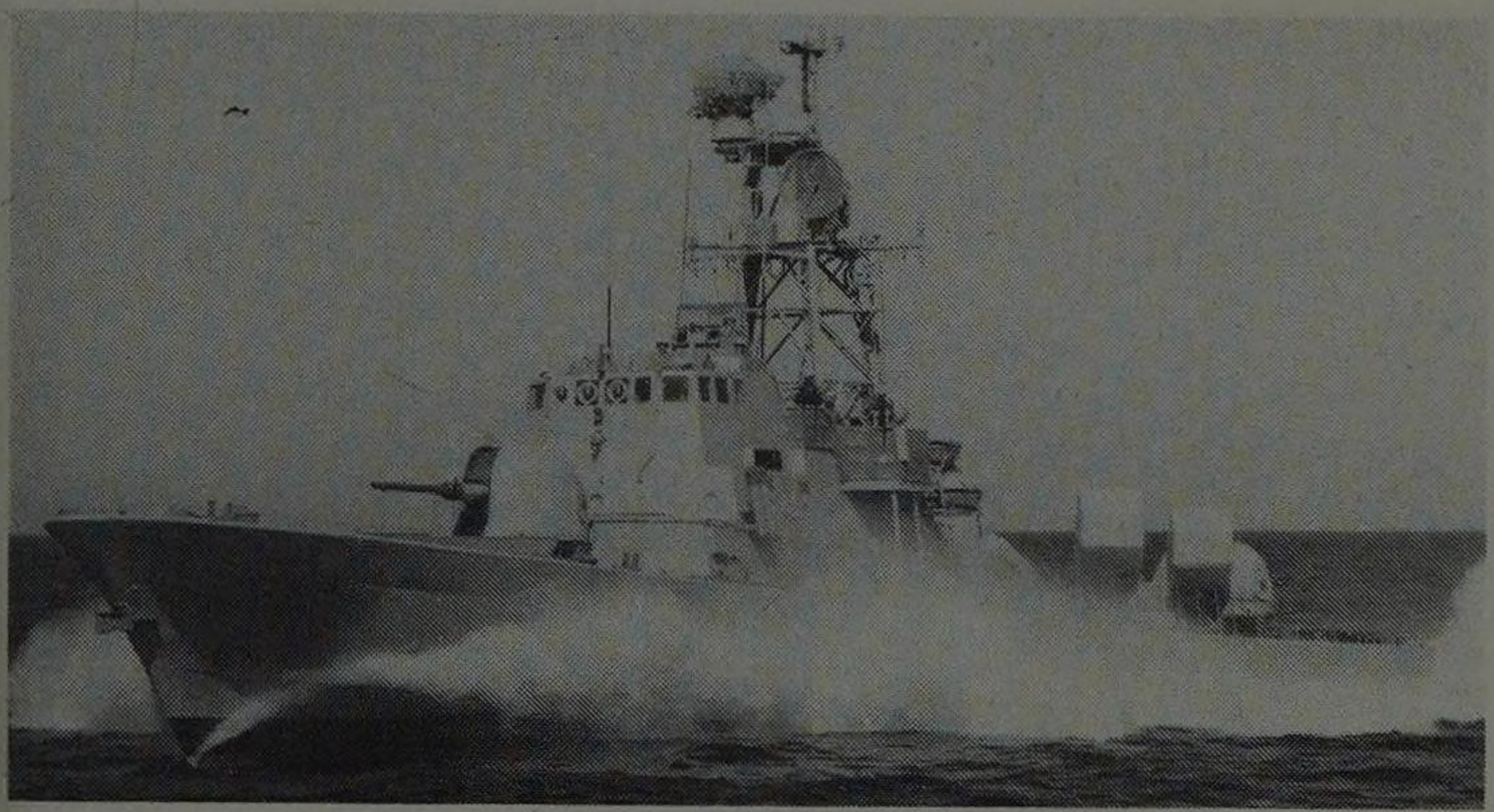


Thetis (P6052) anti-submarine corvette, 1978.

Role: Anti-submarine.
Builder: Roland Werft, Federal Germany.
User: Federal German Navy.
Basic data: 660 t full displacement; 229 ft (69.8 m) except *Thetis* which is 223.75 ft (68.21 m) overall length; 26.9 ft (8.2 m) maximum beam. **Crew**: 48.
Propulsion: 2 MAN diesels (total 6,800 bhp); 2 propellers.
Sensors: TRS-N combined air and sea search radar; 1 Kelvin Hughes Type 149 nav radar; 1 ELAC 1BV sonar.
Armament: 1 quadruple-barrelled Bofors 375 mm anti-submarine rocket launcher (forward of bridge); 4 single heavy-weight anti-submarine torpedo tubes (port and starboard pairs aft of funnel); 1 twin Bofors 40 mm anti-aircraft gun (on elevated platform aft).
Top speed: 23.5 kt. **Range**: 2,800 nautical miles at 16 kt.
Programme: a 5 ship class, these vessels and their service entry dates are: *Thetis* (P6052), March 1960; *Hermes* (P6053), August 1960; *Najade* (P6054), December 1960; *Triton* (P6055), August 1961; and *Theseus* (P6056), March 1962.
Notes: Designed as torpedo recovery boats, a role in which they provide a useful peacetime service, the Thetis class corvettes make ideal submarine chasers in the in-shore waters of the Baltic and its multi-channelled mouth. Besides the variation in overall length between the lead boat and the other four mentioned above, *Najade* (P6054) embodies a larger forward superstructure, while the aft superstructures vary considerably between the vessels.

Rashef/Minister class

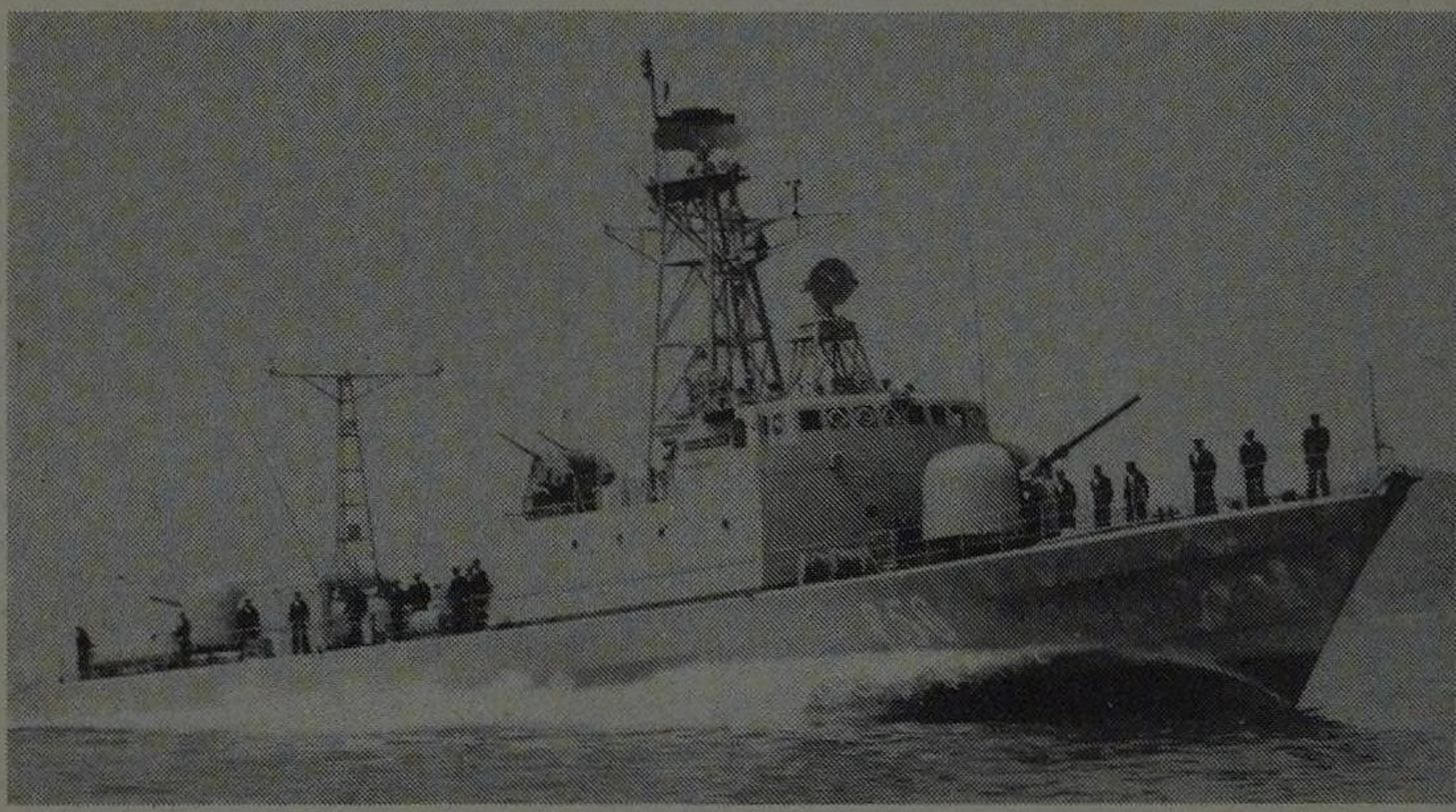
Fast attack craft



A South African Minister class with 4 locally-developed missiles.

Role: Anti-shipping. **Users**: Chile, Israel and South Africa.
Builders: Israel Shipyards, Israel, and Durban, South Africa.
Basic data: 450 t full displacement; 190.5 ft (58 m) overall length; 25 ft (7.8 m) maximum beam. **Crew**: 45.
Propulsion: 4 MTU MD671 diesels (total 10,680 bhp); 2 propellers.
Sensors: 1 Thomson/CSF Neptune combined air and sea search radar; 1 Selenia Orion fire control radar (Thomson/CSF Vega air/sea search radars reported fitted in South African craft).
Armament: 2 twin Harpoon plus 9 single Gabriel anti-ship missile launchers (South African boats carry no Harpoon, but carry up to 7 Gabriel or 4 indigenously designed anti-ship missiles); 2 single OTO-Melara 76 mm dual-purpose guns; 2 (Israeli) or 4 (South African) single Oerlikon 20 mm anti-aircraft guns.
Top speed: 32 kt. **Range**: 4,000 nautical miles at 17.5 kt.
Programme: The Israeli Navy operate 8 Rashef class, all delivered between 1973 and 1980; 2 having been transferred to Chile. South Africa has ordered 12 of these craft, the last 9 being built in South Africa. Named after South African Ministers of Defence, 6 craft were known to be in service at the end of 1981, all accepted between September 1977 and March 1980.
Notes: Big, seaworthy craft combining endurance with speed.

La Combattante III class Fast attack craft



Antipliarchos Lascos (P50) of the Hellenic Navy.

Role: Anti-shipping. **Builder**: CNM Normandy, France.
Users: Navies of Greece and Nigeria.
Basic data: 400 t (Greek) or 425 t (Nigerian) full displacement; 183.7 ft (56 m) overall length; 25.9 ft (7.9 m) maximum beam. **Crew**: 42.
Propulsion: 4 various MTU diesels (total 15,000 to 20,840 bhp); 4 propellers.
Sensors: 1 air search radar; 1 surface search and nav radar; 1 fire control radar (all Thomson CSF equipment).
Armament: 4 Exocet anti-ship missile launchers; 2 single 76 mm OTO-Melara purpose guns (aft 76 mm gun replaced by 1 twin Breda 40 mm anti-aircraft gun on Nigerian craft); 2 twin Emerlec 30 mm anti-aircraft guns; 2 single lightweight anti-submarine torpedo tubes.
Top speed: 32.5 kt. **Range**: 2,000 nautical miles at 15 kt.
Programme: Greece was the first nation to place orders for this class, contracting for 4 craft, all delivered during 1977 and comprising *Antipliarchos Lascos* (P50), *Antipliarchos Blessas* (P51), *Antipliarchos Troupakis* (P52) and *Antipliarchos Mukonios* (P53). In 1977, Nigeria placed orders for 3 of the slightly heavier La Combattante IIIB class, few details of which are as yet available.
Notes: These large fast attack craft are the latest in an evolving series of La Combattante designs that can cover up to 700 nautical miles at maximum sustainable speed.

Lazaga class

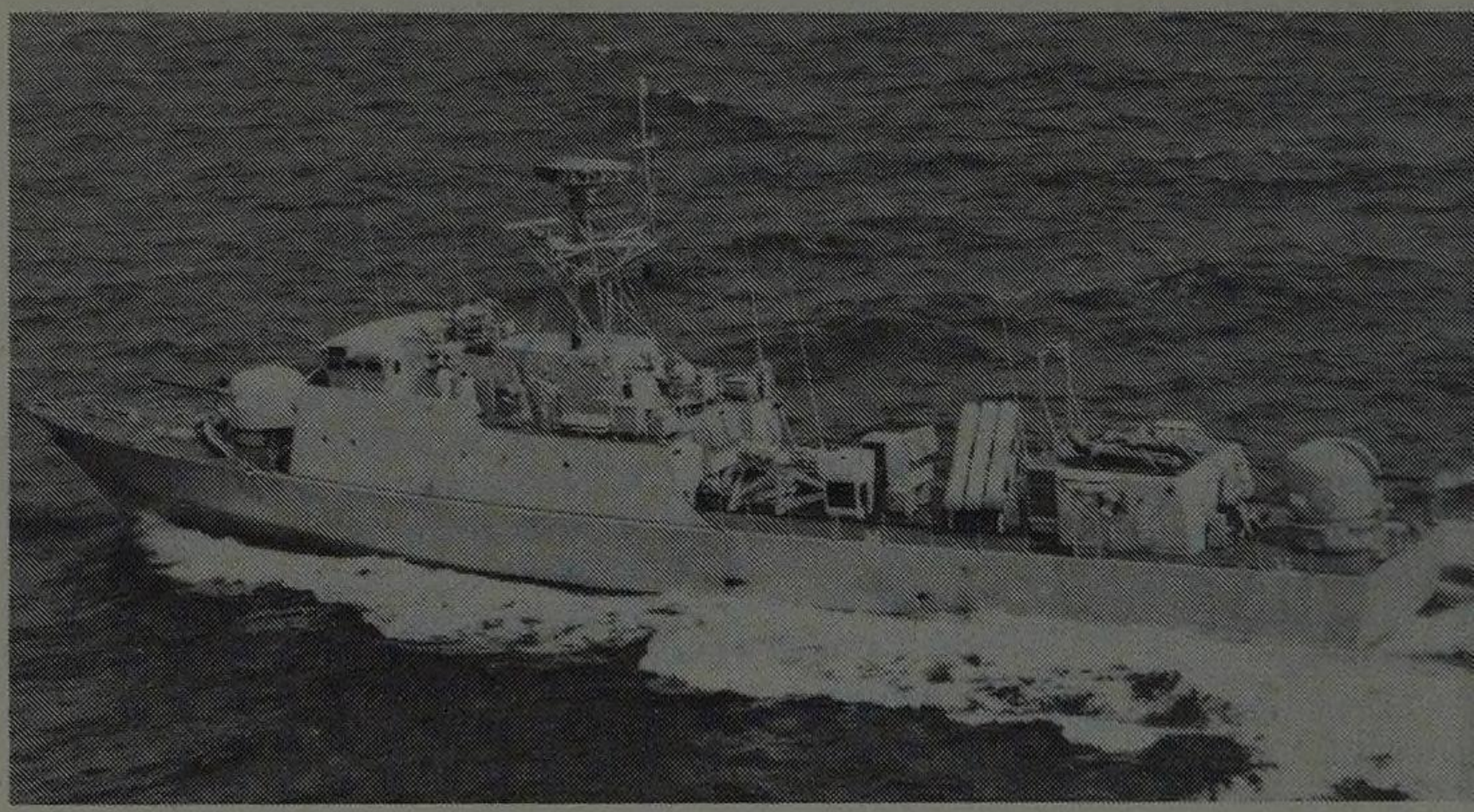
Fast attack craft

Lazaga (P-01) with its US 76 mm Mk 22 gun forward.

Role: General-purpose. **Users**: Spanish Navy, Royal Moroccan Navy and Egyptian Navy.
Builders: Lurssen, West Germany, and Bazan, Spain.
Basic data: 400 t full displacement; 190.6 ft (58.1 m) overall length; 24.9 ft (7.6 m) maximum beam. **Crew**: 39.
Propulsion: 2 MTU MA-16V956 TB91 diesels (total 7,780 bhp); 2 propellers.
Sensors: 1 Raytheon 1620/6 nav radar; 1 Hollandse M22 fire control radar; provision for sonar equipment.
Armament: 1 single OTO-Melara 76 mm dual-purpose gun (1 single 76 mm Mk 22 gun in *Lazaga*); 1 single Breda-Bofors 40 mm anti-aircraft gun; 2 single 20 mm anti-aircraft guns. Provision has been made for anti-ship missiles.
Top speed: 29.5 kt. **Range**: 4,200 nautical miles at 17 kt.
Programme: A 6 ship class for the Spanish Navy comprising the Lurssen-built lead craft, *Lazaga* (P-01), along with the Bazan-built P-02 through P-06. Service entry dates for these craft were July 1975 (P-01), February 1977 (P-02), July 1976 (P-03), April 1977 (P-04), July 1977 (P-05) and December 1977 (P-06). Morocco and Egypt ordered 4 and 6 of the slightly smaller but faster **Cormoran class** craft in mid-1977 and mid-1982, respectively.
Notes: Lurssen have optimised the design of these large, seaworthy boats around a high speed cruise capability, the craft being able to cover 2,260 nautical miles at 27 knots.

Province class

Fast attack craft

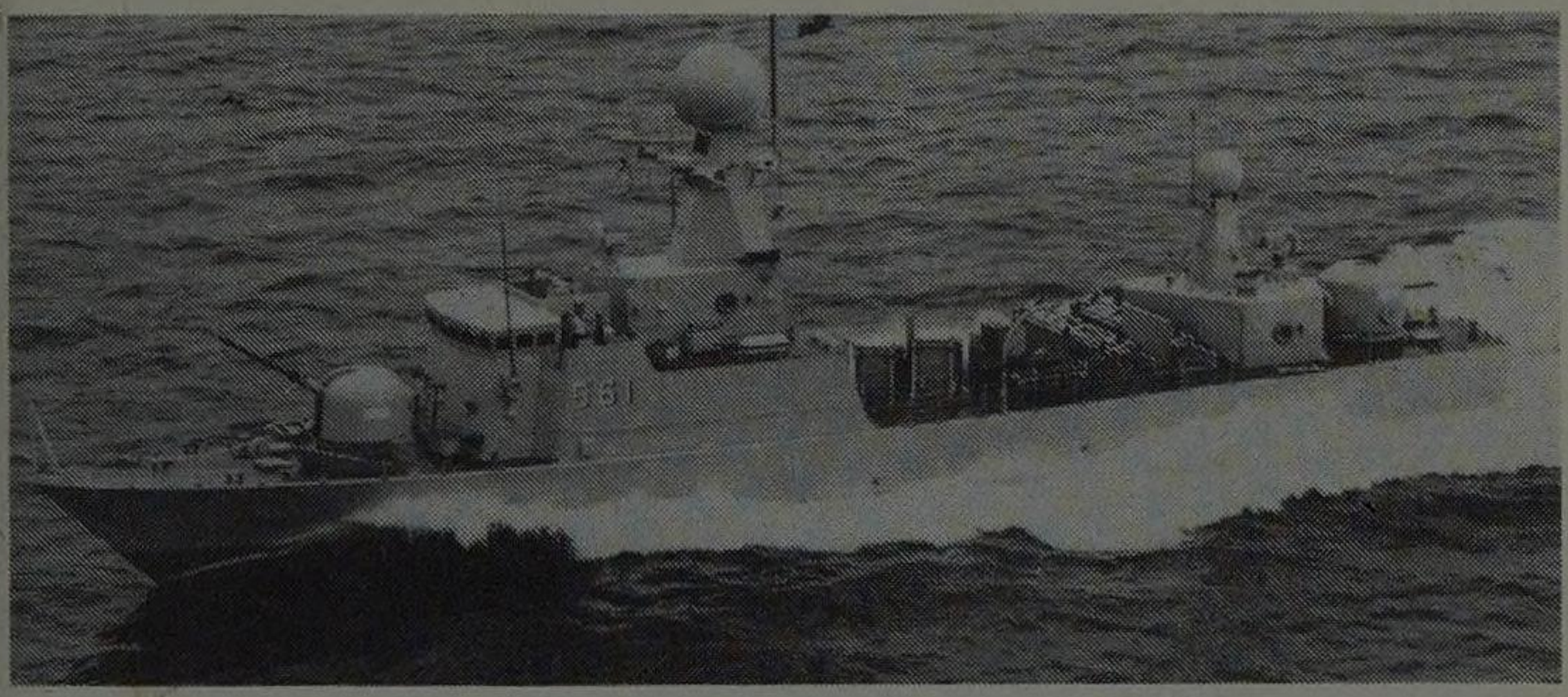


Omani Navy's SNV *Dhofar*, 1982.

Role: Anti-shipping. **Builder**: Vosper Thornycroft, UK.
User: Omani Navy.
Basic data: 370 t full displacement; 186 ft (56.7 m) overall length; 26.9 ft (8.2 m) maximum beam. **Crew**: 65.
Propulsion: 4 Paxman Valenta 18M diesels (total 15,200 bhp); 4 propellers.
Sensors: 1 Decca AC 1226 nav radar; 1 Sperry Sea Archer fire control system; IFF facilities.
Armament: 6 Exocet (or 8 Sea Killer optional fit) anti-ship missile launchers; 1 single 76 mm OTO-Melara dual-purpose gun; 1 Breda 40 mm anti-aircraft gun.
Top speed: 38 kt. **Range**: 2,000 nautical miles at 16 kt.
Programme: The first of this 3 craft class was ordered late in 1979, to be followed by a further 2 craft order in January 1981. The class comprises SNV *Dhofar* plus 2 more as yet unnamed vessels. All three were laid down between September 1980 and December 1981 and should be completed in July 1982, November 1983 and January 1984, respectively.
Notes: The Province class craft are the largest fast attack craft yet to be built in Vosper Thornycroft's Porchester yards. Their high speed, agility, relatively small size and powerful anti-ship armament provide this class with a potent strike capability against much larger, well-armed warships. The total cost of the 3 craft programme was put at around £75 million in 1981.

Ramadan class

Fast attack craft



ARES *Ramadan* during sea trials, 1980.

Role: Anti-shipping.
Builder: Vosper Thornycroft, UK.
User: Egyptian Navy.
Basic data: 324 t full displacement; 170.6 ft (52 m) overall length; 24.9 ft (7.6 m) maximum beam. **Crew**: 37.
Propulsion: 4 MTU 20V 538 diesels (total 17,150 bhp); 4 propellers.
Sensors: 1 Marconi S820 search radar; 1 Marconi ST802 tracking radar; 1 Marconi/Sperry gun fire control system; 1 Decca RM1226 nav radar.
Armament: 2 twin Otomat anti-ship missile launchers; 1 OTO-Melara 76 mm dual-purpose gun; 1 twin Breda 40 mm anti-aircraft gun.
Top speed: Over 35 kt. **Range**: 1,600 nautical miles at 18 kt.
Programme: The Egyptian Government order for this 6 boat class was placed in September 1977 and was valued by the builders as being in excess of £150 million. All 6 hulls were laid down between September 1979 and February 1980 and all launches took place in the period September 1979 and November 1980. The first two vessels, ARES *Ramaden* and ARES *Khyber*, were accepted during July and September 1981, respectively, while the remaining four, ARES *El Kadesseya*, ARES *El Yarmouk*, ARES *Hettein* and ARES *Badr*, were accepted during 1982.
Notes: With a hull design based on that of Vosper Thornycroft's earlier Tenacity class boats, the larger, heavier Ramadan class carry an impressive armament of 32 nautical mile ranging Otomat anti-ship missiles, backed by a 2-tier anti-air gun capability.

Willemoes class

Fast attack craft

Hammer (P542) without aft-mounted Harpoons, 1978.

Role: Anti-shipping.

Builder: Frederikshavn, Denmark.

User: Royal Danish Navy.

Basic data: 265 t full displacement; 151.25 ft (46.1 m) overall length; 24.25 ft (7.4 m) maximum beam. **Crew**: 25.

Propulsion: 3 Rolls-Royce Proteus gas turbines (total 12,750 shp) or 2 General Motors 8V-71 diesels (total 960 bhp) arranged in CODOG; 3 c-p propellers.

Sensors: 1 Philips (Sweden) combined search and fire control radar.

Armament: 1 OTO-Melara 76 mm gun; 4 torpedo tubes or 2 twin Harpoon anti-ship missile launchers or 20 mines.

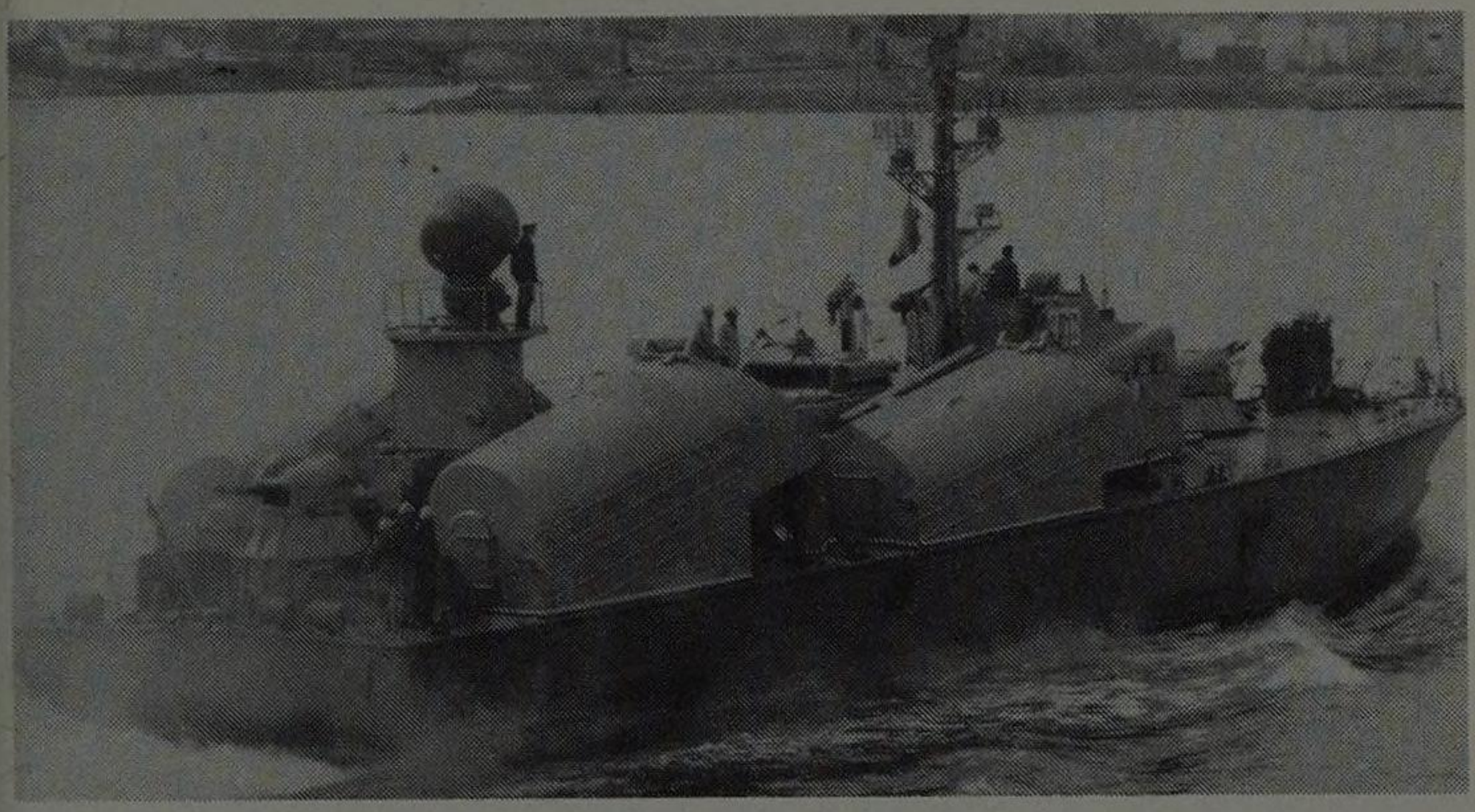
Top speed: 40 kt. **Range**: 400 nautical miles at 36 kt.

Programme: Deliveries of this 10 craft class were *Willemoes* (P549) and *Bille* (P540) in 1976; *Bredal* (P541), *Hammer* (P542), *Huitfeldt* (P543) and *Krieger* (P544) in 1977; plus the *Norby* (P545), *Rodsteen* (P546), *Sehested* (P547) and *Suenson* (P548) in 1978.

Notes: The Willemoes' structure and layout closely follows that of the Spica class fast attack craft operated by the Swedish Navy. As with the Spica, the Willemoes class were designed around a primary armament of 4 heavyweight, wire-guided 21 inch, Swedish Type 61 anti-submarine torpedoes with a reported range of 10.85 nautical miles. In service the Willemoes class boats have demonstrated an impressive versatility of weapons fitment, including the carriage of 4 Harpoons, with their 60 nautical mile range, while retaining the ability to mount 2 of the heavyweight torpedoes.

Osa I/II classes

Fast attack craft



A Soviet-built Osa I entering harbour.

Role: Anti-shipping. **Builders**: Various, USSR.
Users: Navies of Algeria, Bulgaria, China, Cuba, East Germany, Egypt, Finland, India, Iraq, Libya, North Korea, Poland, Romania, Somalia and Syria.
Basic data: 240 t full displacement; 127.95 ft (39 m) overall length; 25.25 ft (7.7 m) maximum beam. **Crew**: 30.
Propulsion: 3 M504 diesels (15,000 bhp); 3 propellers in Osa IIs; Osa Is have 3 M503A diesels (12,000 bhp); 3 propellers.
Sensors: 1 surface search and nav radar; 1 fire control radar; 3 IFF.
Armament: 4 single SS-N-2 STYX anti-ship missile launchers; 2 twin 30 mm anti-aircraft guns. Note: Osa IIs carry an improved model of the SS-N-2 STYX with a range of around 40 rather than the 25 nautical miles of the earlier version.
Top speed: 36 kt (Osa II). **Range**: 700 nautical miles at 20 kt.
Programme: Around 200 of these boats have been built, of which about 120 are operated by the Soviet Navy and of which 70 are Osa Is, plus 50 Osa IIs. Construction of the Osa Is took place between 1959 and 1966, with Osa II building continuing from 1966 to 1970.
Notes: Indian Navy Osa class boats saw action in the Indo-Pakistan war of 1971, sinking a Pakistani destroyer and severely damaging another, along with sinking or damaging several merchant ships.

Spica class

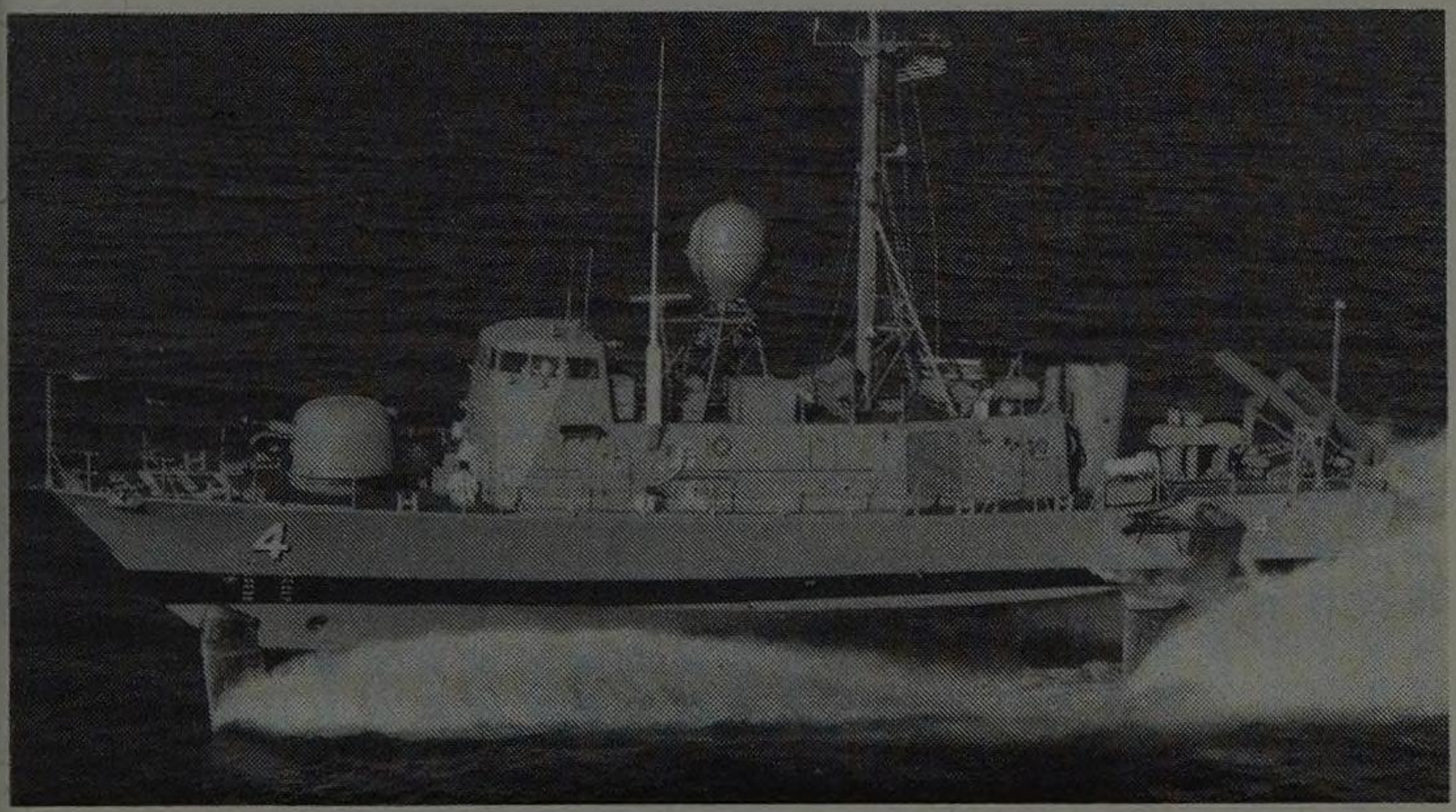
Fast attack craft

Virgo (T126), a Spica class boat of the Royal Swedish Navy.

Role: Anti-shipping. **Builder**: Karlskrona, Sweden.
User: Royal Swedish Navy.
Basic data: 235 t full displacement; 139.4 ft (42.5 m) overall length; 24 ft (7.3 m) maximum beam. **Crew**: 28.
Propulsion: 3 Rolls Royce Proteus 1274 gas turbines (total 12,720 shp); 3 c-p propellers.
Sensors: 1 Decca nav radar; 1 Hollandse M22 fire control radar.
Armament: 1 single 57 mm anti-aircraft gun; 6 heavyweight anti-submarine torpedo tubes or mines. Note: Prior to 1985, the boats are to be refitted to carry 8 RBS-15 anti-ship missiles at the expense of 4 torpedo tubes.
Top speed: 40 kt. **Range**: 400 nautical miles at 36 kt.
Programme: This 6 boat class comprises *Spica* (T121), *Sirius* (T122), *Capella* (T123), *Castor* (T124), *Vega* (T125) and *Virgo* (T126). All 6 boats entered service between 1966 and 1967 and are scheduled to undergo modernisation during the first half of the 1980s.
Notes: Extremely fast, seaworthy boats, the Spica class, along with the improved 12 boat Spica II class, are visually characterised by their aft-mounted superstructure and large, forward-mounted gun turret. With their shallow draft of just under 5.25 ft (1.6 m) at full load, these very fast, agile craft are ideal for operations in the frequently shallow waters of the Baltic, offering a very low radar signature to an enemy by virtue of their small size.

Pegasus class

Fast attack craft

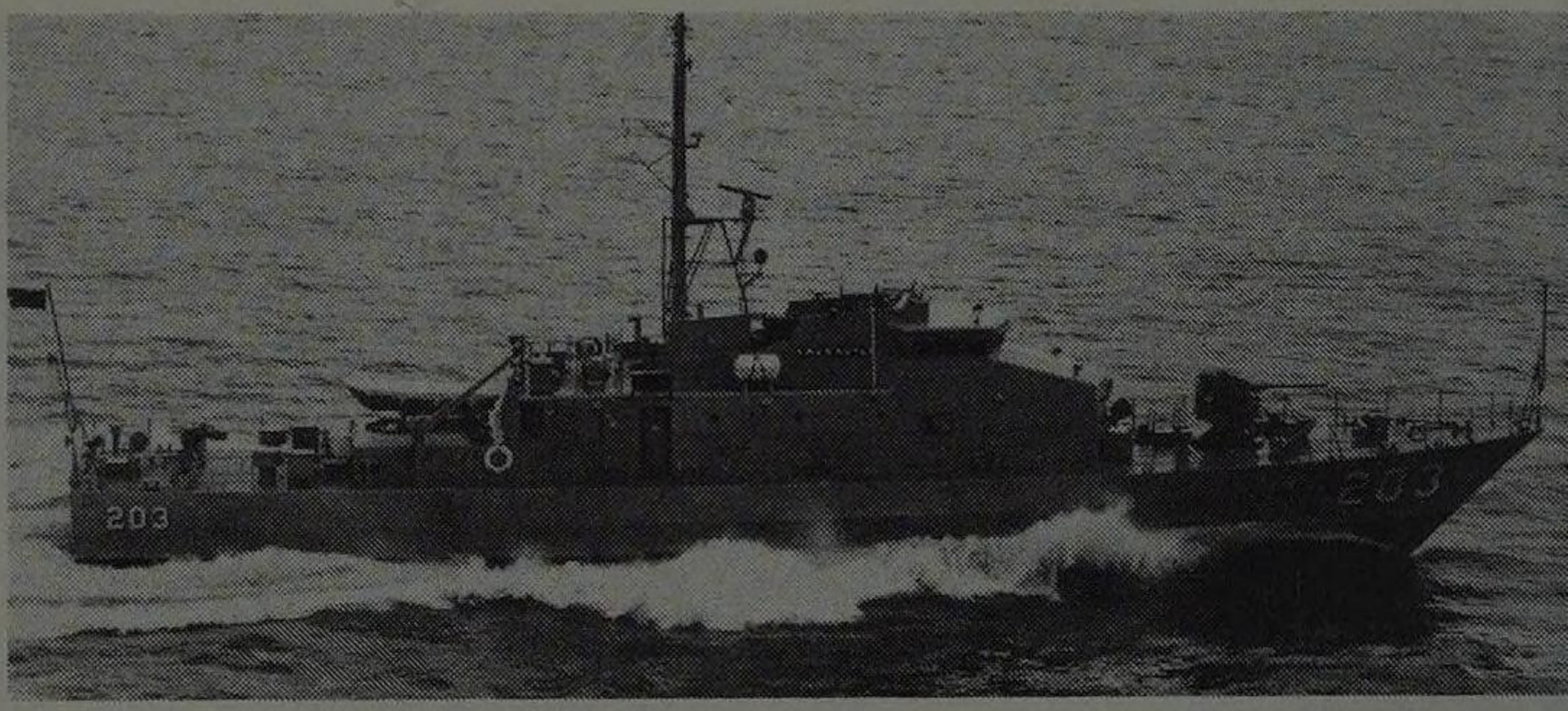


Aquila (PHM-4) foilborne.

Role: Anti-shipping. **Builder**: Boeing Marine, USA.
User: US Navy.
Basic data: 231 t full displacement; 131.5 ft (40.1 m) overall length (on foils); 28.2 ft (8.6 m) maximum beam. **Crew**: 21.
Propulsion: 1 General Electric LM2500 gas turbine (18,000 shp) or 2 MTU 8V331 diesels (total 1,600 bhp). The gas turbine drives 1 Aerojet General waterjet when foilborne. When hullborne, the 2 diesels provide power to 2 waterjets and bow thruster.
Sensors: 1 Mk 94 (Hollandse WM 28) fire control radar.
Armament: 2 quadruple Harpoon anti-ship missile launchers; 1 single 76 mm Mk 75 anti-aircraft gun.
Top speed: Over 40 kt. **Range**: Over 500 nautical miles on foils.
Programme: Boeing received the design contract for this craft in November 1971 and was given go-ahead to build the lead craft in April 1973, at which time it was envisaged as the first of a 30 vessel class, but when the series production contract was placed in November 1977, the number had been reduced to 5 craft, which form the 6 hydrofoil class comprising: *Pegasus* (PHM-1), *Hercules* (PHM-2), *Taurus* (PHM-3), *Aquila* (PHM-4), *Aries* (PHM-5) and *Gemini* (PHM-6). All were scheduled to have been delivered by 1982.
Notes: These 6 hydrofoils are based in Key West, Florida.

Fremantle class

Fast attack craft



HMAS *Fremantle* (P203) on sea trials, 1979.

Role: Offshore patrol.
Builders: Brooke Marine, UK, and NQE, Australia.
User: Royal Australian Navy.
Basic data: 230 t full displacement; 137.8 ft (42 m) overall length; 23.45 ft (7.15 m) maximum beam. **Crew**: 22.
Propulsion: 2 MTU 16V 538 TB91 diesels (total 7,200 bhp); 2 propellers.
Sensors: 1 Kelvin Hughes Type 1006 nav radar.
Armament: 1 Bofors 40 mm Mk VII; 2 single 12.6 mm machine guns; 1 aft-mounted 81 mm mortar.
Top speed: 29 kt. **Range**: 2,450 nautical miles at 15 kt.
Programme: In September 1977, Brooke Marine received an Australian Government order calling for the construction of the lead boat, HMAS *Fremantle* (P203), of a 15 craft class, along with the provision of lead yard services to the Australian Navy and North Queensland Engineers of Cairn, who have responsibility for the building of the remaining 14 Fremantles, P204 through P217. Laid down in December 1977 and launched in February 1979, HMAS *Fremantle* (P203) was commissioned on 17 March 1980. By the end of 1981, *Fremantle* had been joined by HMAS *Warrnambool* (P204), HMAS *Townsville* (P205) and HMAS *Wollongong* (P206), with another 6 craft under construction.
Notes: Ordered as a replacement for the Royal Australian Navy's Attack class patrol boats, the primary role of the Fremantles is to act as long-range coastal pickets against illegal immigrant landing, hence the lack of heavier armament.

Al Mansur class

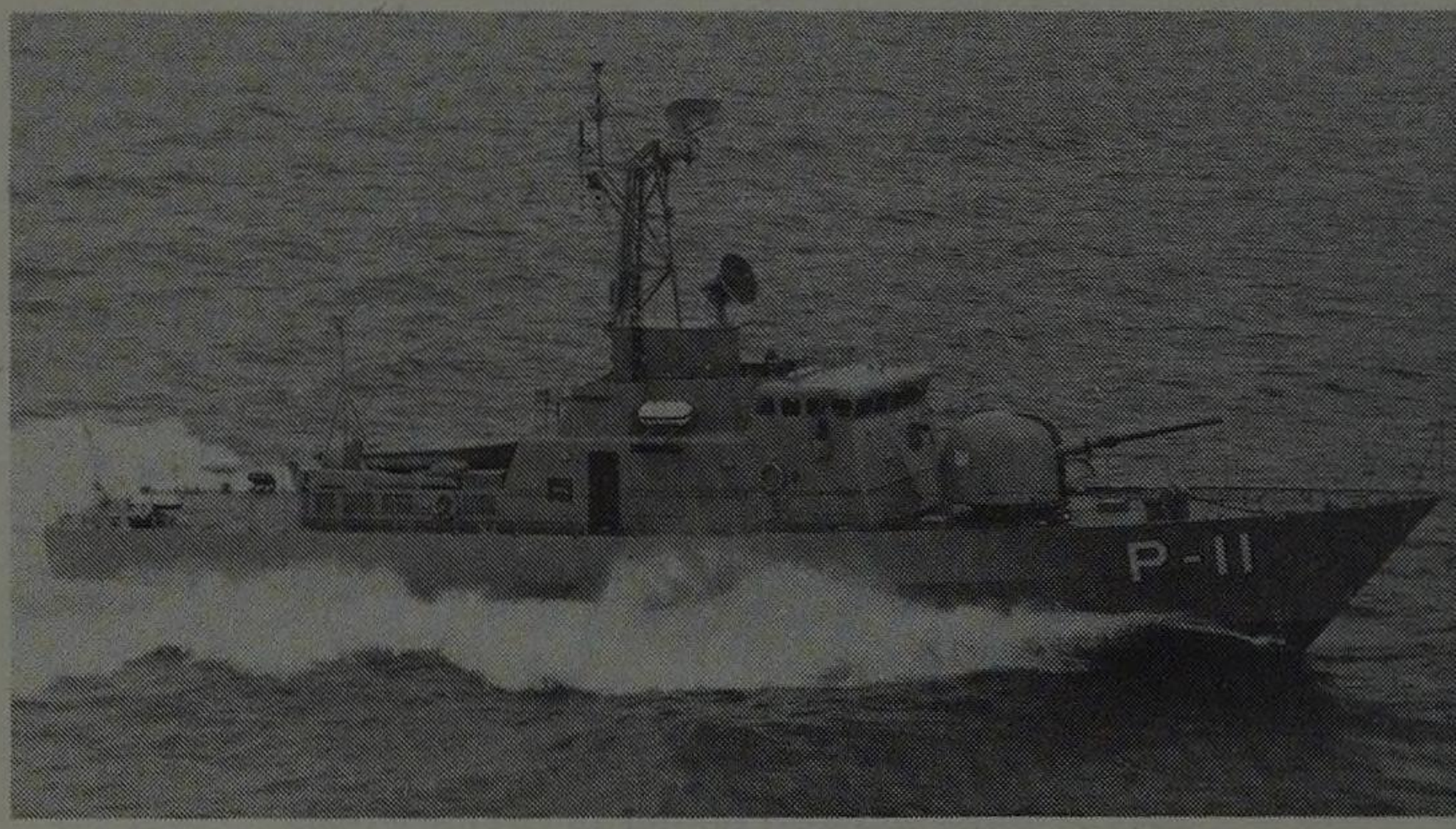
Fast attack craft

SNV *Al Mujahid* (B-6) during its 1977 sea trials.

Role: Anti-shipping. **Builder**: Brooke Marine, UK.
User: Omani Navy.
Basic data: 180 t full displacement; 123 ft (37.5 m) overall length; 20 ft (6.1 m) maximum. beam. **Crew**: 27.
Propulsion: 2 Paxman Ventura YJCM diesels (total 4,800 bhp); 2 propellers.
Sensors: 1 Decca TM 916 nav radar; 1 Sperry Sea Archer fire control system.
Armament: 2 Exocet anti-ship missile launchers (on B1, B2, B3 only); 1 single 76 mm OTO-Melara dual-purpose gun; 1 single 20 mm Bofors anti-aircraft gun; 2 single 12.7 mm machine guns.
Top speed: 26 kt. **Range**: 2,800 nautical miles at 12 kt.
(B-1), *Al Mansur* (B-2), *Al Nejah* (B-3), *Al Wafi* (B-4), *Al Fulk* (B-5), *Al Mujahid* (B-6) and *Al Jasbbar* (B-7). Delivered between March 1973 and August 1977, the first 3 craft were modified to carry Exocet between 1977 and 1979, but B-1 was lost during its return to Oman, when, in November 1978, it was swept overboard from a freighter in the Bay of Biscay and sunk.
Notes: Developed from Brooke Marine's smaller 108 feet (32.9 m) Standard Patrol Craft, the Al Mansur class have a somewhat similar appearance to that of the comparably sized Vosper Thornycroft 110 feet standard hulled craft (see Barzan class, p. 155), the main visual difference centring on the Al Mansur class's larger forward-mounted 76 mm gun mount.

Constitucion class

Fast attack craft



ARV *Constitucion* (P11) of the Venezuelan Navy.

Role: Anti-shipping. **Builder**: Vosper Thornycroft, UK.
User: Venezuelan Navy.
Basic data: 170 t full displacement; 121 ft (36.9 m) overall length; 23.45 ft (7.2 m) maximum beam. **Crew**: 18.
Propulsion: 2 MTU MD16V538 diesels (total 7,080 bhp); 2 propellers.
Sensors: 1 combined air/sea search radar; 1 ELSAG NA 10 fire control radar; 1 Kelvin Hughes MS 45 echo sounder; 1 Navamatic direction finder.
Armament: 1 OTO-Melara 76 mm dual-purpose gun (P11, P13 and P15) or 2 Otomat anti-ship missile launchers; 1 single Bofors 40 mm anti-aircraft gun (P12, P14 and P16).
Top speed: 31 kt. **Range**: 1,350 nautical miles at 16 kt.
Programme: Ordered in April 1972 for a sum in excess of £6 million, this 6 craft class and their delivery dates were: *Constitucion* (P11) August 1974, *Federacion* (P12) March 1975, *Independencia* (P13) September 1974, *Libertad* (P14) June 1975, *Patria* (P15) January 1975 and *Victoria* (P16) September 1975.
Notes: With a hull based on that of the earlier Tenacity craft, the Constitucion class boats departed from the latter 1960s trend of going for speedy, relatively short-ranged, gas turbine-powered craft in the adoption of more fuel-economic diesels in order to provide the longer operational ranges needed.

Barzan class

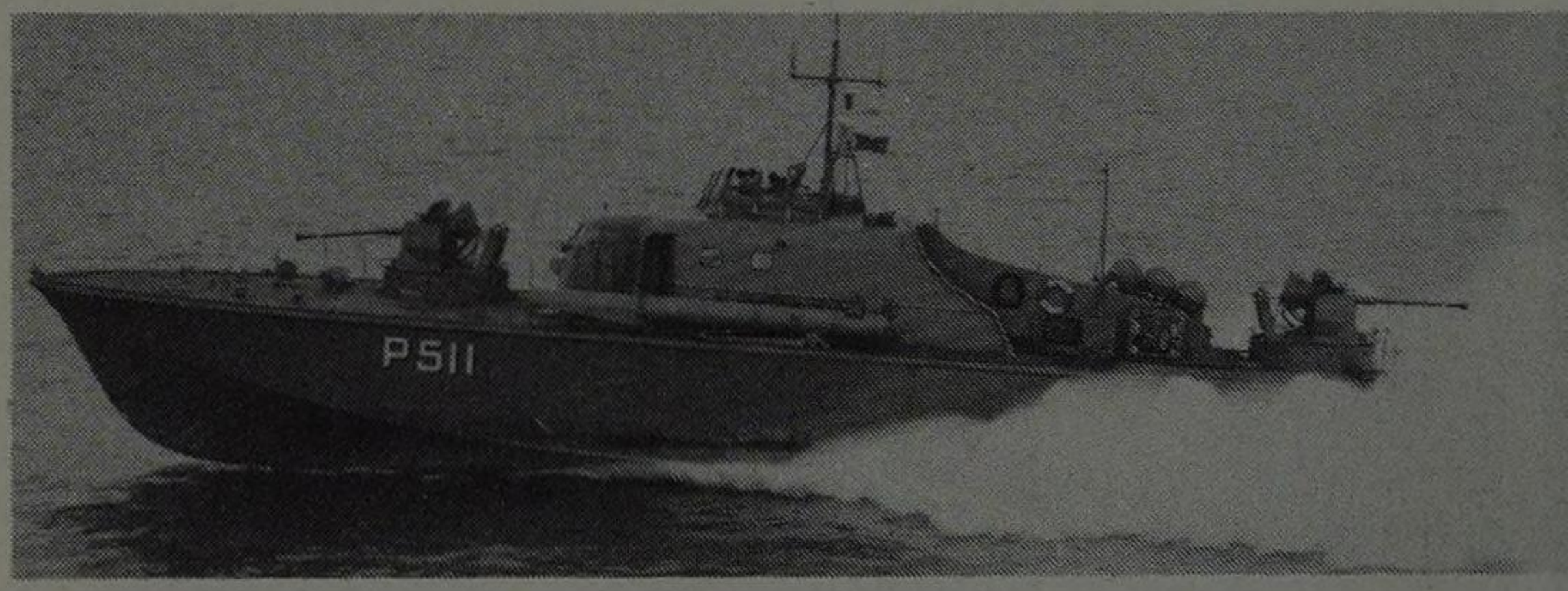
Fast attack craft

The Qatar Barzan class with HMS *Amazon* in background, 1982.

Role: Patrol. **Builder**: Vosper Thornycroft, UK.
Users: Qatar, Abu Dhabi, Singapore and Peru.
Basic data: 140 t full displacement; 110 ft (33.5 m) overall length; 21 ft (6.4 m) maximum beam. **Crew**: 27.
Propulsion: 2 Paxman Valente 16RP 200M diesels (total 6,350 bhp); 2 propellers.
Sensors: 1 Decca 1226 navigation radar.
Armament: 2 twin Oerlikon 30 mm GCM guns.
Top speed: 30 kt. **Range**: 1,400 nautical miles at 14 kt.
Programme: This 6 craft class was ordered in 1973, laid down in 1974/5 and delivered between January 1975 and March 1976. The six craft comprise *Barzan* (Q11), *Hwar* (Q12), *That Assuari* (Q13), *Al Wussail* (Q14), *Al Khatab* (Q15) and *Tariq* (Q16). These 6 craft were the last of 24 Vosper Thornycroft vessels built around a standard 110 ft hull, equipped with engines and armament of the customer's choice. The first 6 of these hulls were ordered by the Peruvian Coast Guard and delivered during 1965. The next order was from Singapore for 2 batches of 3, which differed in armament fit and which were delivered in 1971 and 1972. Six more of these craft, the **Ardhana class**, P1101 to P1106, were delivered to Abu Dhabi between 1974 and 1975.
Notes: The presence of the attractively raked funnel gives these relatively small warships a distinctly corvette-like appearance, except in the case of the 6 Singapore vessels that lack funnels.

Soloven class

Fast attack craft



Soridderen (P511) undergoing sea trials, 1964.

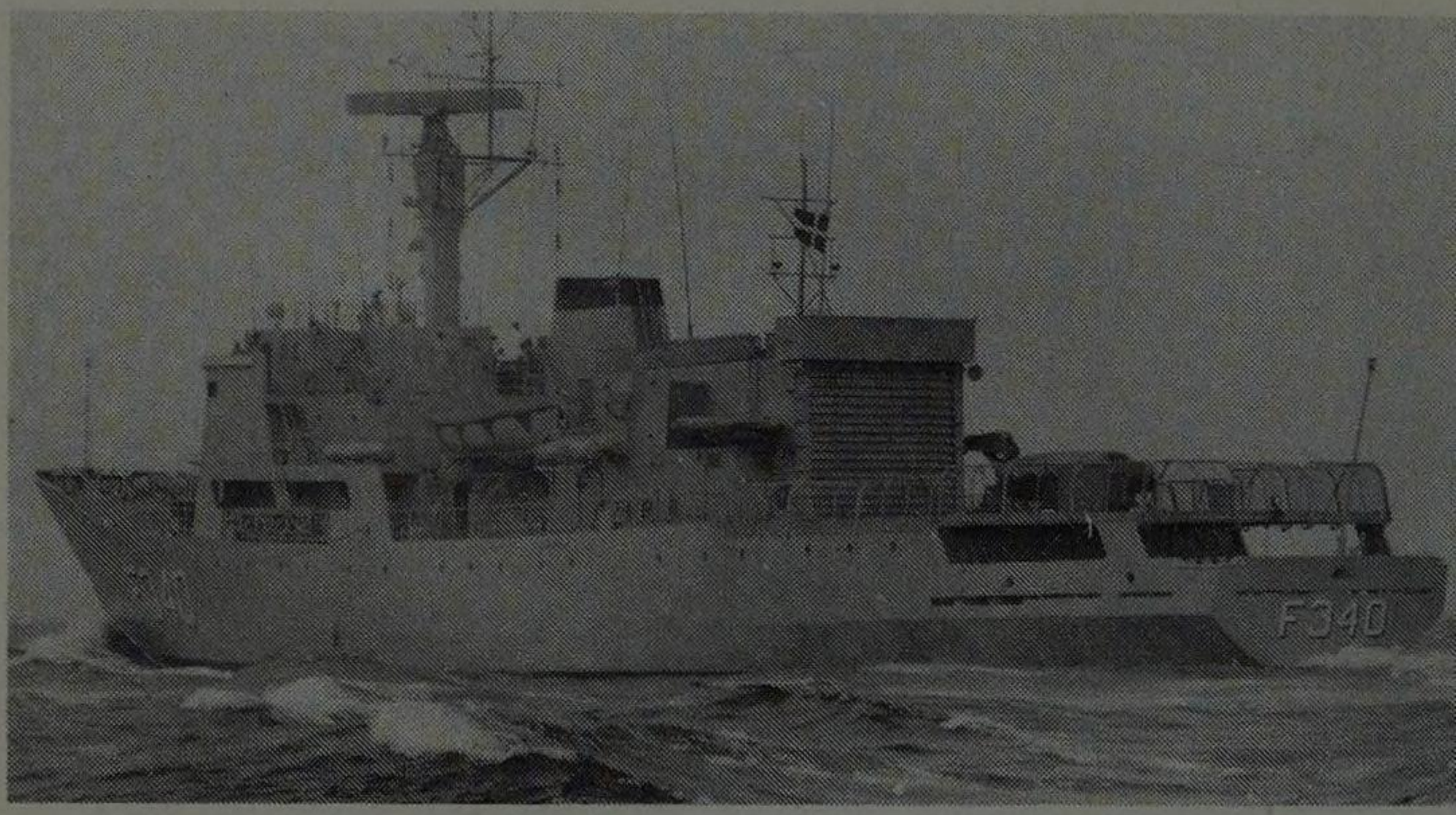
Role: Anti-shipping.
Builders: Vosper, UK, and Royal Danish Dockyards.
User: Royal Danish Navy.
Basic data: 114 t full displacement; 99.1 ft (30.26 m) overall length; 26.25 ft (8.0 m) maximum beam. **Crew**: 29.
Propulsion: 3 Rolls-Royce Proteus gas turbines (total 12,600 shp) or 2 General Motors 6V-71 diesels (total 300 bhp); 3 propellers.
Sensors: 1 Decca 1226 navigational radar.
Armament: 2 single Bofors 40 mm guns; 2 single torpedo tubes.
Top speed: 54 kt. **Range**: 1,800 nautical miles at 9 kt.
Programme: The 1962 Danish Government order for 2 Vosper-built craft carried provision for the building of a further 4 boats under licence by the Royal Danish Dockyards. Completion dates for the 6 boats were: *Soloven* (P510) and *Soridderen* (P511), June 1964; *Sobjornen* (P512), September 1965; *Sohesten* (P513), June 1966; *Sohunden* (P514), December 1966; and *Soulven* (P515), March 1967.
Notes: Amongst the fastest conventional-hulled craft ever built, the Soloven class boats are an improved version of Vosper's Brave design with the diesel facility for economic cruising added (this feature being first tested aboard Vosper's slightly smaller *Ferocity* built in 1960 as a private venture demonstrator). The armament combination of the Soloven class boats can be varied to delete one of the guns, allowing the carriage of 2 additional Swedish Tp-61 wire-guided torpedoes. These wooden-hulled craft are not scheduled to be withdrawn from Danish service until the mid-1980s.

Broadsword type

Fast attack craft

Guatemala's *Kukulkan* (P1051), 1976.

Role: Coastal patrol. **Builder**: Halter Marine, USA.
User: Guatemalan Navy.
Basic data: 92.1 t full displacement; 105 ft (32.0 m) overall length; 20.4 ft (6.2 m) maximum beam. **Crew**: 20.
Propulsion: 2 General Motors 16V149T1 diesels (total 3,200 bhp); 2 propellers.
Sensors: 1 Decca navigational radar.
Armament: Single 75 mm gun; 1 mortar; up to 3 light machine guns.
Top speed: 32 kt. **Range**: 1,150 nautical miles at 20 kt.
Programme: Delivery of the sole example purchashed, *Kukulkan* (P1051), was made in 1976, the craft entering service in August of that year as the flagship of the small Guatemalan Navy.
Notes: Typical of the many more lightly armed patrol craft operated by the navies of the so-called Third World nations, the armament of this boat was fitted after delivery to Guatemala. The craft's seemingly large electrical generating capacity, provided by twin 30 KW generators, becomes more understandable in the light of the installation of 8 tons of heating and air-conditioning equipment.



The Royal Danish Navy's *Beskytteren* (F340).

Role: Fishery protection. **Builder**: Aalborg, Denmark.
User: Royal Danish Navy.
Basic data: 1,970 t full displacement; 244 ft (74.4 m) overall length; 38.8 ft (11.8 m) maximum beam. **Crew**: 59.
Propulsion: 4 B & W Alpha diesels (total 7,440 bhp); 1 c-p propeller.
Sensors: 1 CWS 2 surface search radar; 1 NWS 1 nav radar; 1 Plessey MS 26 hull-mounted sonar.
Armament: 1 Alouette III helicopter; 1 single 76 mm dual-purpose gun.
Top speed: 18 kt. **Range**: 6,000 nautical miles at 13 kt.
Programme: The *Beskytteren* (F340), an Improved Hvidbjornen type, is the sole example of its kind. The ship was laid down in 1970 and completed during 1975.
Notes: Despite its pennant number—which would indicate that the ship was a light frigate or corvette—the *Beskytteren* was built specifically as a fishery protection vessel, its large size being dictated by its need to operate in the waters around Greenland. The ship's single 76 mm gun is mounted forward of the wheelhouse. Aft of the superstructure is a sizeable, elevated helicopter operating pad and hangar for the ship's Aerospatiale Aloutte III. The *Beskytteren* is a much larger vessel than the preceding 4 ship Hvidbjornen class that have a full load displacement of 1,650 tons.

Castle class

Patrol vessels

HMS *Leeds Castle* (P258), August 1981.

Role: Offshore protection. **Builder**: Hall Russell, UK.
User: Royal Navy.
Basic data: 1,450 t full displacement; 265.75 ft (81 m) overall length; 37.75 ft (11.5 m) maximum beam. **Crew**: 50.
Propulsion: 2 Ruston 12RKCM diesels (total 5,640 bhp); 2 propellers.
Sensors: 1 Kelvin Hughes Type 1006 nav radar; 1 Decca CANE automatic plotter; 1 Kelvin Hughes Type 778A echo sounder.
Armament: Facility to operate 1 up to Sea King sized helicopter; 1 Bofors 40 mm Mk 3 gun; 2 machine guns.
Top speed: 19.5 kt. **Range**: 10,000 nautical miles at 12 kt.
Programme: Initially known as the Offshore Protection Vessel (OPV) Mk 2, the first order for 2 Royal Navy ships was placed in August 1980. These ships, HMS *Leeds Castle* (P258) and HMS *Dumbarton Castle* (P259), are now in service, having been accepted in August 1981 and March 1982, respectively.
Notes: The Castles are the largest of a series of Hall Russell-developed OPVs to be built so far. As with the earlier Jura and Island class ships from the same yards, the Castles are built to Lloyd's Register commercial standards, rather than to costlier naval practices. Besides the Castle class, which can accommodate 25 marines in addition to the crew, armed variants of the OPV Mk 2 are on offer to meet anti-submarine, anti-air, anti-shipping or general-purpose roles at significantly lower cost than comparably armed vessels built to more expensive naval building standards.

Island class

Patrol vessels

The Royal Navy's HMS *Anglesey* (P277), 1978.

Role: Offshore protection. **Builder**: Hall Russell, UK.
User: Royal Navy.
Basic data: 1,280 t full displacement; 195.2 ft (59.5 m) overall length; 36 ft (11 m) maximum beam. **Crew**: 39.
Propulsion: 2 Ruston 12RKCM diesels (total 4,380 bhp); 1 c-p propeller.
Sensors: 1 Kelvin Hughes Type 1006 surface search and nav radar; 1 Decca navigator/position fixer; 1 Kelvin Hughes MS45 echo sounder.
Armament: Facilities to operate Westland Lynx sized helicopter; 1 single Bofors 40 mm Mk 3 anti-aircraft gun; 2 machine guns.
Top speed: 16.5 kt. **Range**: 11,000 nautical miles at 12 kt.
Programme: The first of this 7 ship class was laid down in late 1975, the ships and their commissioning dates being: HMS *Anglesey* (P277), May 1979; HMS *Alderney* (P278), November 1979; HMS *Jersey* (P295), October 1976; HMS *Guernsey* (P297), October 1977; HMS *Shetland* (P298), July 1977; HMS *Orkney* (P299), February 1977; and HMS *Lindisfarne* (P300), January 1978.
Notes: The Island class vessels are a direct design development of the earlier *Jura* and *Westra* patrol vessels built for the Scottish Department of Fisheries. Built to civil Lloyd's Register standards, these specialist offshore patrollers afford a much more economic means of policing the nation's waters than could be achieved using a conventional naval corvette or light frigate. The Island class can accommodate an additional 25 Royal Marines.

Emer class

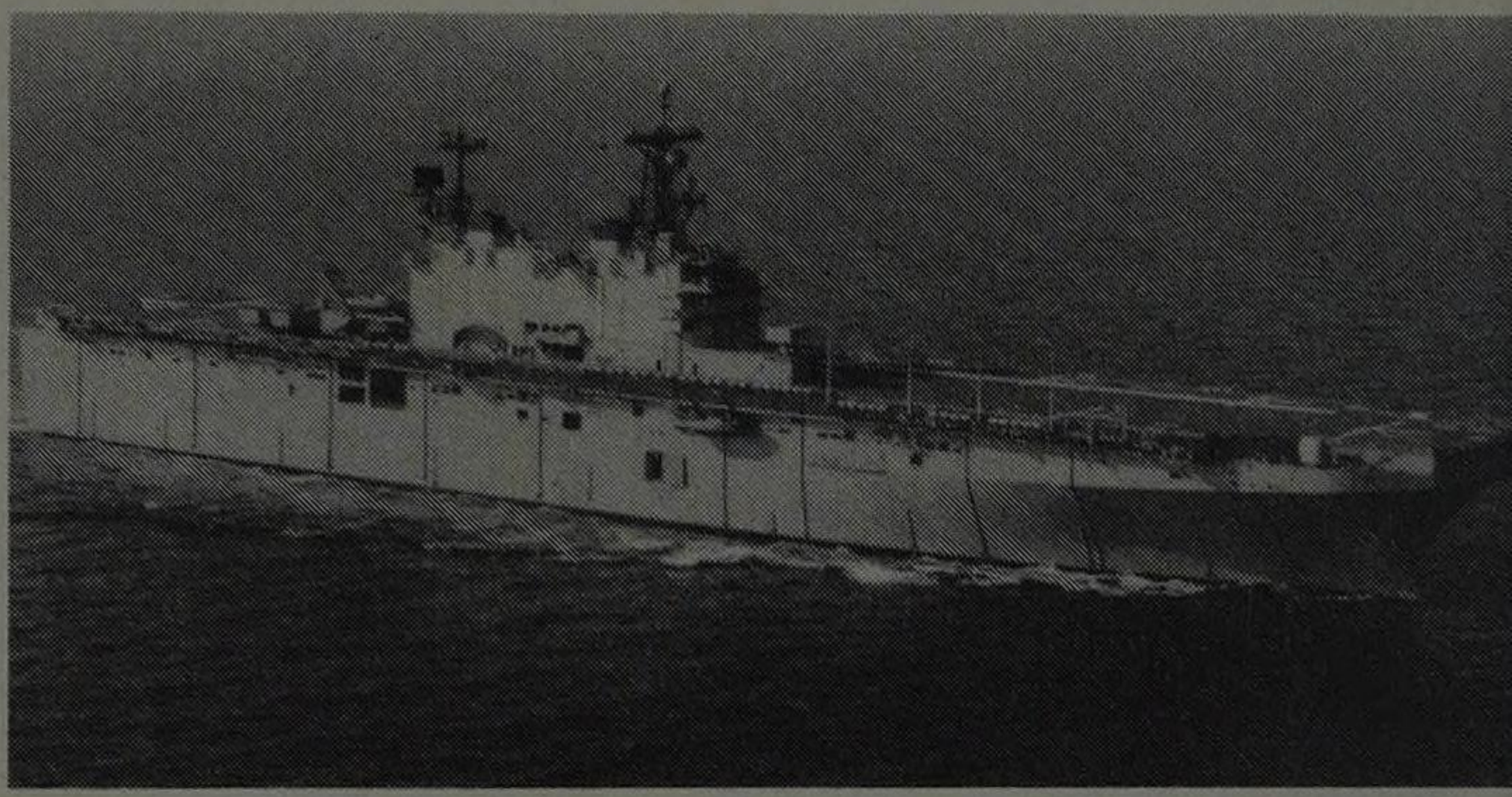
Patrol vessels

The Dutch designed Irish Navy ship *Emer* (P21), 1981.

Role: Fishery protection. **Builder**: Verolme, Ireland.
User: Irish Navy.
Basic data: 1,020 t full displacement; 213.9 ft (65.2 m) overall length; 34.1 ft (10.4 m) maximum beam. **Crew**: 46.
Propulsion: 2 SEMT-Pielstick 6 PA6L-280 diesels (total 4,800 bhp); 1 c-p propeller.
Sensors: 2 Decca nav radars; 1 Decca Mk 21 navigator; 1 Simrad SU hull-mounted sonar.
Armament: 1 single 40 mm Bofors and 2 single 20 mm Oerlikon anti-aircraft guns.
Top speed: 18 kt. **Range**: 6,750 nautical miles at 12 kt.
Programme: Based on the earlier *Deirdre* (FP20), the 3 ship Emer class vessels consist of *Emer* (P21), *Aoife* (P22) and *Aisling* (P23), all of which were laid down between early 1977 and October 1979 and entered service in January 1978, October 1979 and May 1980, respectively.
Notes: Extremely seaworthy vessels, the handsomely proportioned Emer class ships are a slightly larger and heavier development of the sole-of-class *Deirdre* (FP20), commissioned in May 1972 and which was the first Irish Navy vessel to be built in an Irish shipyard. Along with a planned new class of even larger helicopter-carrying patrol vessels, all of these ships are of Dutch design and have been, or will be fabricated in the Dutch-controlled Verolme dockyards in Cork.

Tarawa class

Assault ships



USS *Tarawa* (LHA 1) in the Gulf of Mexico, March 1976.

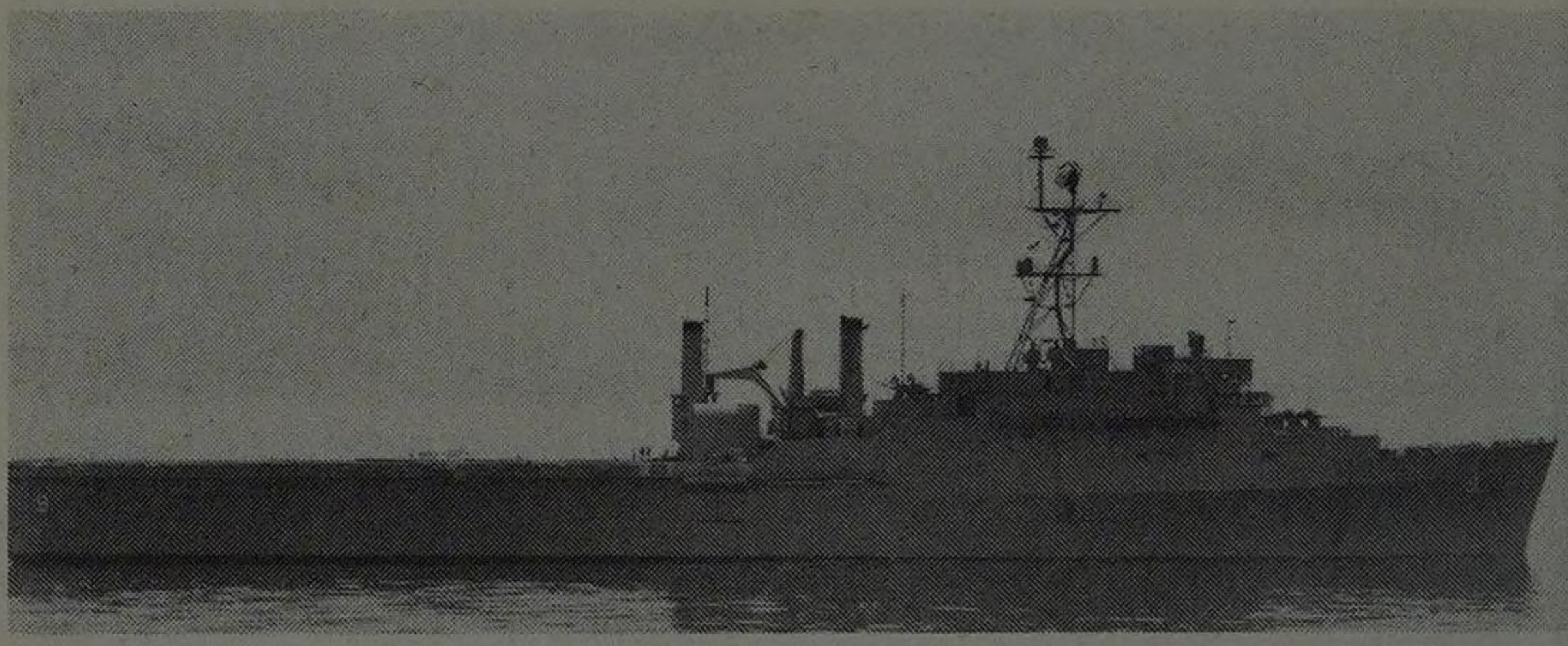
Role: Amphibious warfare.
Builder: Ingalls Shipbuilding, USA.
User: US Navy.
Basic data: 39,300 t full displacement; 820 ft (249.9 m) overall length; 106.6 ft (32.5 m) maximum beam. **Crew**: 894.
Propulsion: 2 Westinghouse geared steam turbines (total 140,000 shp); 2 propellers.
Sensors: Comprehensive suite of SPS-52B (3-D), SPS-40B (air) and SPS-10F (surface) search radars; 1 Mk 86 and 2 Mk 115 fire control systems; TACAN aircraft homer.
Armament: 2 octuple Mk 25 Sea Sparrow surface-to-air missile launchers; 3 Mk 45 dual-purpose 5 in guns; 6 single 20 mm Mk 67 anti-aircraft guns; 2 Phalanx 20 mm close-in weapons systems (fitted from 1981 onwards).
Top speed: 24 kt. **Range**: 10,000 nautical miles at 20 kt.
Programme: Originally planned to be a 9 ship class, the Tarawa build was cut back to 5 ships in January 1971. All 5 ships, USS *Tarawa* (LHA 1), USS *Saipan* (LHA 2), USS *Belleau Wood* (LHA 3), USS *Nassau* (LHA 4) and USS *Peleliu* (LHA 5), were ordered in a 36-month period between 1969 and 1971. US Navy acceptance of the respective ships took place in May 1976, October 1977, September 1978, July 1979 and May 1980.
Notes: While the detail planning and constructional phases of this programme, in company with virtually every other US major naval programme of the period, were best characterised as

crisis-torn, the end result is an extremely impressive vessel. These Tarawa class ships are the largest amphibious vessels built to date, being designed to combine the capabilities of no less than 4 previous types of US Navy assault ship within the one vast hull. Thus the Tarawa class ship can embark, transport over great distances, tactically deploy and stay to support a Marine Amphibious Unit of around 1,900 men, 5 M-60 tanks, 6 105 mm field howitzers, 11 large amphibious assault vehicles, mortars and various complements of anti-tank missiles and their supporting composite squadron of about 22 helicopters, ranging from the massive Sikorsky CH-53 Sea Stallion, through the Boeing Vertol CH-47 Sea Knight to the agile, anti-tank TOW missile equipped Bell AH-1T Hueycobra. Within the Tarawa's stern well deck there is sufficient room to dock a pair of 390 ton tank-carrying landing craft, or up to 17 of the smaller LCM 6 craft of 62 tons displacement. Not only is there a need rapidly to disembark nearly 2,000 men, but also several hundred tons of stores needed to support them. To meet this large cargo moving need, the ships incorporate an elaborate overhead conveyancing system, capable of handling up to 240 pallets per hour. Each ship is also equipped with very complete hospital facilities, including intensive care units for up to 90 people. Besides being routinely capable of operating both helicopters and the AV-8 Harrier, the spacious flight deck is ample from which to operate such short take-off and landing types as the North American OV-10 Bronco.

USS *Saipan* (LHA) 2), 1980.

Austin class

Assault ships



USS *Denver* (LPD9). The funnels are side-mounted (aft to port).

Role: Amphibious warfare.
Builders: Various, USA.
User: US Navy.
Basic data: 16,900 t full displacement; 570 ft (173.7 m) overall length; 84 ft (25.6 m) maximum beam.
Crew: 447.
Propulsion: 2 De Laval geared steam turbines (total 24,000 shp); 2 propellers.
Sensors: 1 SPS-40 air search radar; 1 SPS-10 surface search and nav radar; 1 URN-20 TACAN aircraft homer.
Armament: 2 twin (reduced from 4 twin as originally fitted) 76 mm Mk 33 anti-aircraft guns; 2 Phalanx 20 mm close-in weapons systems.
Top speed: 20 kt.
Range: In excess of 6,000 nautical miles.
Programme: Laid down between February 1963 and October 1966, this 12 ship class consists of: USS *Austin* (LPD4), USS *Ogden* (LPD5), USS *Duluth* (LPD6), USS *Cleveland* (LPD7), USS *Dubuque* (LPD8), USS *Denver* (LPD9), USS *Juneau* (LPD10), USS *Coronado* (LPD11), USS *Shreveport* (LPD12), USS *Nashville* (LPD13), USS *Trenton* (LPD14) and USS *Ponce* (LPD15). The construction of these ships was shared between the US Navy Shipyard, New York (LPDs 4 to 6), Ingalls (LPD 7 and 8) and Lockheed (LPDs 9 through 15). Commissioning of the class took place between February 1965 and July 1971.
Notes: An enlarged version of the slightly earlier Raleigh class, the Austins can carry up to 930 troops, their vehicles and supplies, who are taken ashore either by landing craft launched from the aft well deck, or by up to 6 Boeing Vertol CH-46 Sea Knight helicopters.

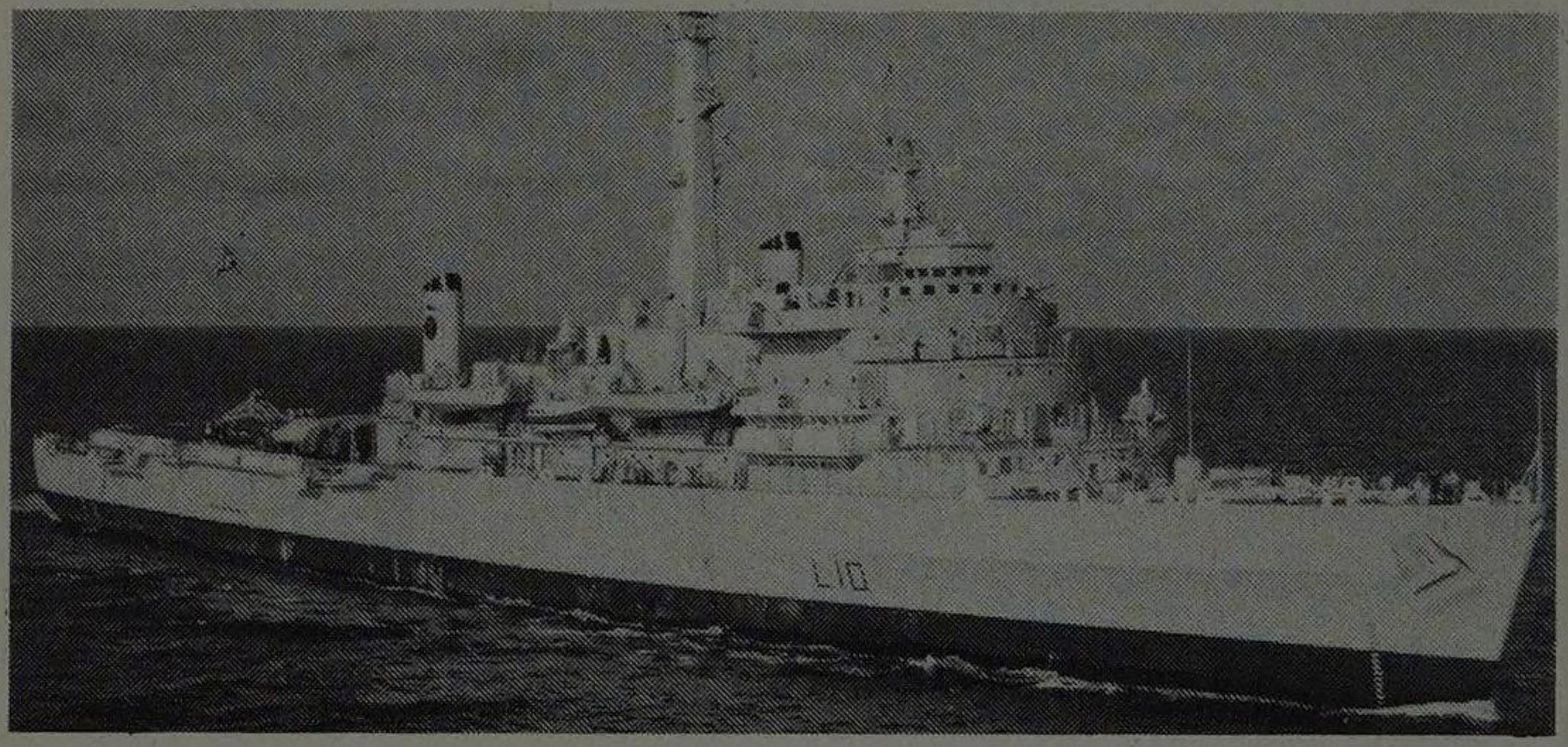
Ivan Rogov class — Assault ships

Ivan Rogov, April 1980.

Role: Amphibious warfare.
Builder: Kaliningrad, USSR.
User: Soviet Navy.
Basic data: 13,000 t full displacement; 520 ft (138 m) overall length; 80 ft (24 m) maximum beam.
Crew: 200.
Propulsion: Gas turbines (total 40,000 shp); 2 propellers.
Sensors: I air search radar/IFF; 2 surface search radars; 4 fire control radars (1 for missiles, 1 for 76 mm and 2 for 30 mm guns).
Armament: Facilities for up to 4 Kamov Ka-25 helicopters; 1 twin SA-N-4 surface-to-air missile launcher; 1 twin 76 mm gun; 4 single Gatling 30 mm guns; I multiple 122 mm bombardment rocket launcher.
Top speed: 20 kt.
Range: Not known.
Programme: *Ivan Rogov* was accepted during 1978 and 1 more of this class was reported to be nearing completion by the end of 1981.
Notes: By far the biggest of the Soviet's assault ships, the *Ivan Rogov* can carry around 550 troops, 30 armoured personnel carriers and 10 tanks. To speed boarding and unboarding, the ship has a floodable well deck aft long enough to house 3 Lebed class 85 ton air-cushion landing craft. Forward, the ship has clam-shell bow doors and ramp, while the weather deck aft of the bow section can double as either a second helicopter pad or storage area for roll-on/roll-off equipment. The ship's helicopter hangar is located immediately forward of the main, stern helicopter pad. The range of the ship's SA-N-4 surface-to-air missiles is reported to be around 8 nautical miles.

Fearless class

Assault ships

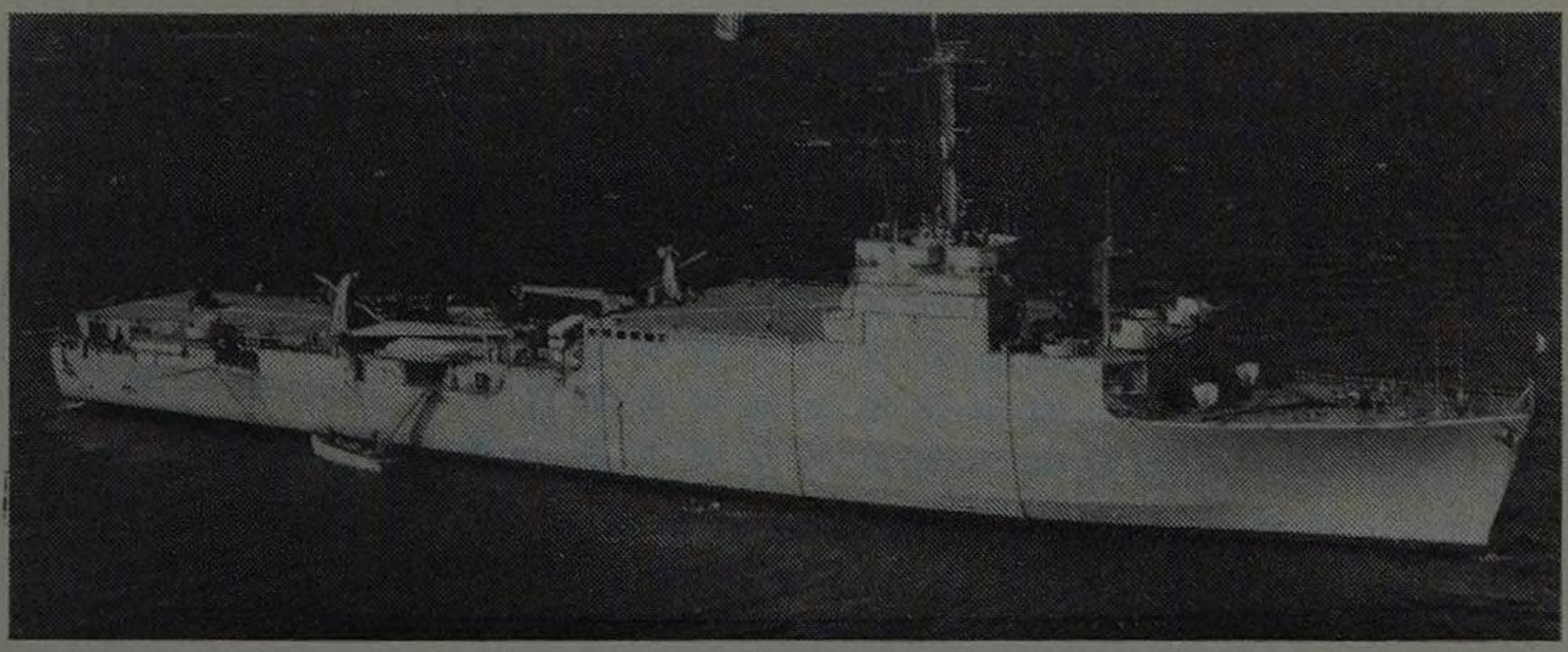


The Royal Navy's HMS *Fearless* (L10).

Role: Amphibious warfare.
Builders: Various, UK.
User: Royal Navy.
Basic data: 12,120 t full displacement; 520 ft (158.5 m) overall length; 80 ft (29.4 m) maximum beam. **Crew**: 447.
Propulsion: 2 English Electric geared steam turbines (22,000 shp); 2 propellers.
Sensors: 1 Type 978 nav radar; 1 Type 993 low-level air and surface search radar; CAAIS automated action information data processing system.
Armament: 4 quadruple Seacat point air defence missile launchers; 2 single 40 mm Bofors anti-aircraft guns.
Top speed: 21 kt. **Range**: 5,000 nautical miles at 20 kt.
Programme: This 2 ship class comprises HMS *Fearless* (L10), built by Harland & Wolff, and HMS *Intrepid* (L11), by John Brown. The 2 ships were commissioned in November 1965 and March 1967.
Notes: Patterned very much on the lines of the US Navy's Raleigh class assault ship, the Fearless class can carry up to 1,000 troops or a mix of fewer troops plus vehicles. As with other ships of this type, the Fearless class incorporate a large docking well aft, which can accommodate up to 4 medium landing craft, while 4 30-troop light landing craft can be carried on davitts each side of the superstructure. The large flight deck aft can operate up 6 Westland Wessex helicopters. Both ships operated with the UK Falklands Task Force.

Ouragan class

Assault ships

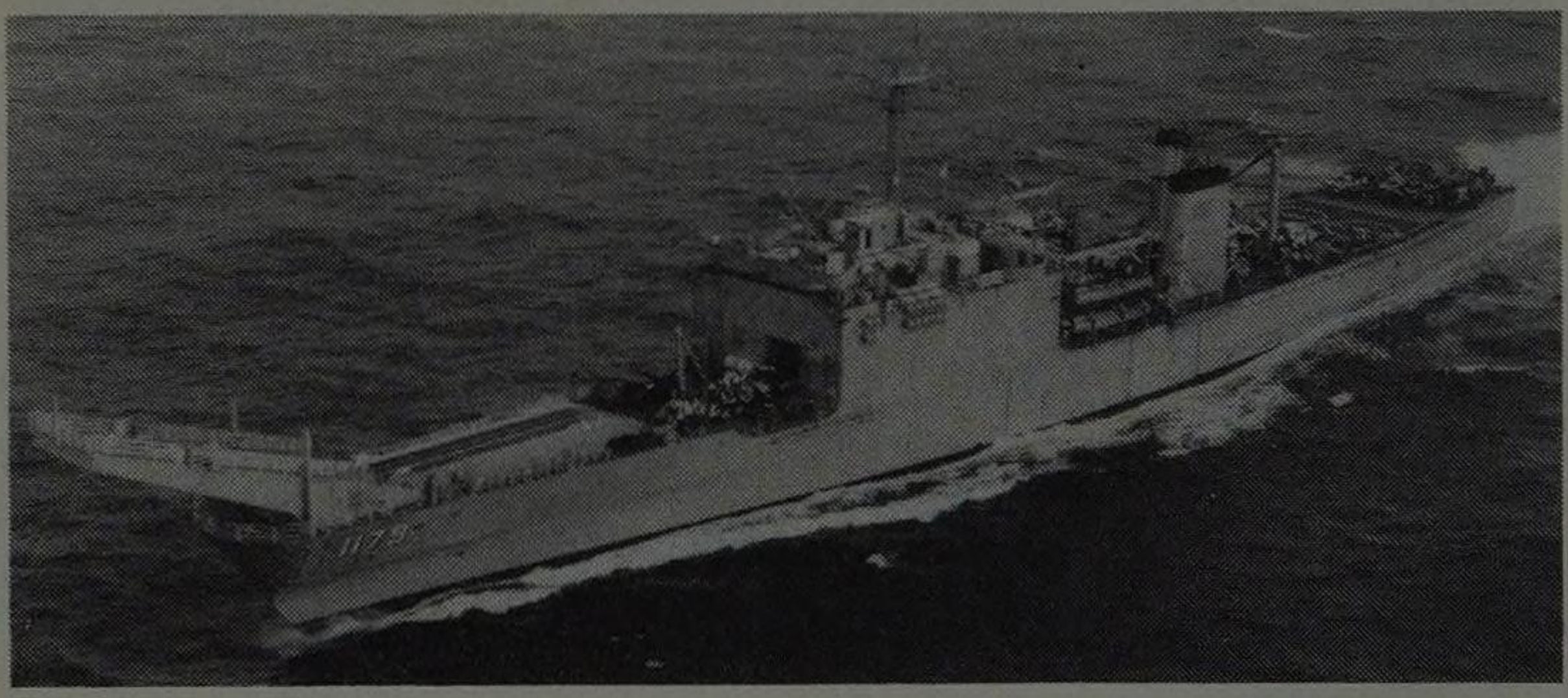


Ouragan (L9021), 1966.

Role: Amphibious warfare. **Builder**: DCAN Brest, France.
User: French Navy.
Basic data: 8,500 t full displacement; 488.85 ft (149 m) overall length; 70.5 ft (21.5 m) maximum beam. **Crew**: 138.
Propulsion: 2 SEMT-Pielstick diesels (total 8,640 bhp); 2 propellers.
Sensors: 1 Decca/DRBN 32 navigational radar; 1 SQS–17 sonar on L9021 only.
Armament: 4 single Bofors 40 mm anti-aircraft guns (on L9021 only).
Top speed: 17.3 kt. **Range**: 4,000 nautical miles at 15 kt.
Programme: A 2 ship class, *Ouragan* (L9021) was ordered in 1960, followed by the contract for *Orage* (L9022) in 1965. *Ouragan* was laid down in June 1962, launched in November 1963 and accepted in June 1965. The keel laying of *Orage* took place in June 1966, with launch in April 1967 and acceptance in March 1968.
Notes: Designed primarily as a Landing Ship, Dock (LSD) with a floodable well deck astern, the ships can also be employed in the logistics support role. In the assault mission, the ships would typically carry around 350 troops, up to 4 Super Frelon or 13 Alouette helicopters, 2 EDIC 670 ton landing craft or 40 amphibious vehicles. In the logistics role, the ships can transport up to 1,500 tons of equipment which could comprise 18 Super Frelon helicopters and all their supporting equipment, or 120 light tanks, or 340 jeeps, space being created by the use of two temporary deck sections, one measuring 295.25 ft (90 m), while the other is 118.1 ft (36 m) in length.

Newport class

Assault ships



USS *Newport* (LST1179) tank landing ship.

Role: Amphibious warfare.

Builders: Various, USA.

User: US Navy.

Basic data: 8, 342 t full displacement; 562 ft (171.3 m) overall length; 69.5 ft (21.2 m) maximum beam. **Crew**: 221.

Propulsion: 6 Alco diesels (total 16,500 bhp); 2 c–p propellers.

Sensors: 1 SPS–10 surface search and nav radar.

Armament: 2 twin 5 inch Mk 32 anti-aircraft guns to be replaced by 2 Phalanx 20 mm close-in weapons systems as available.

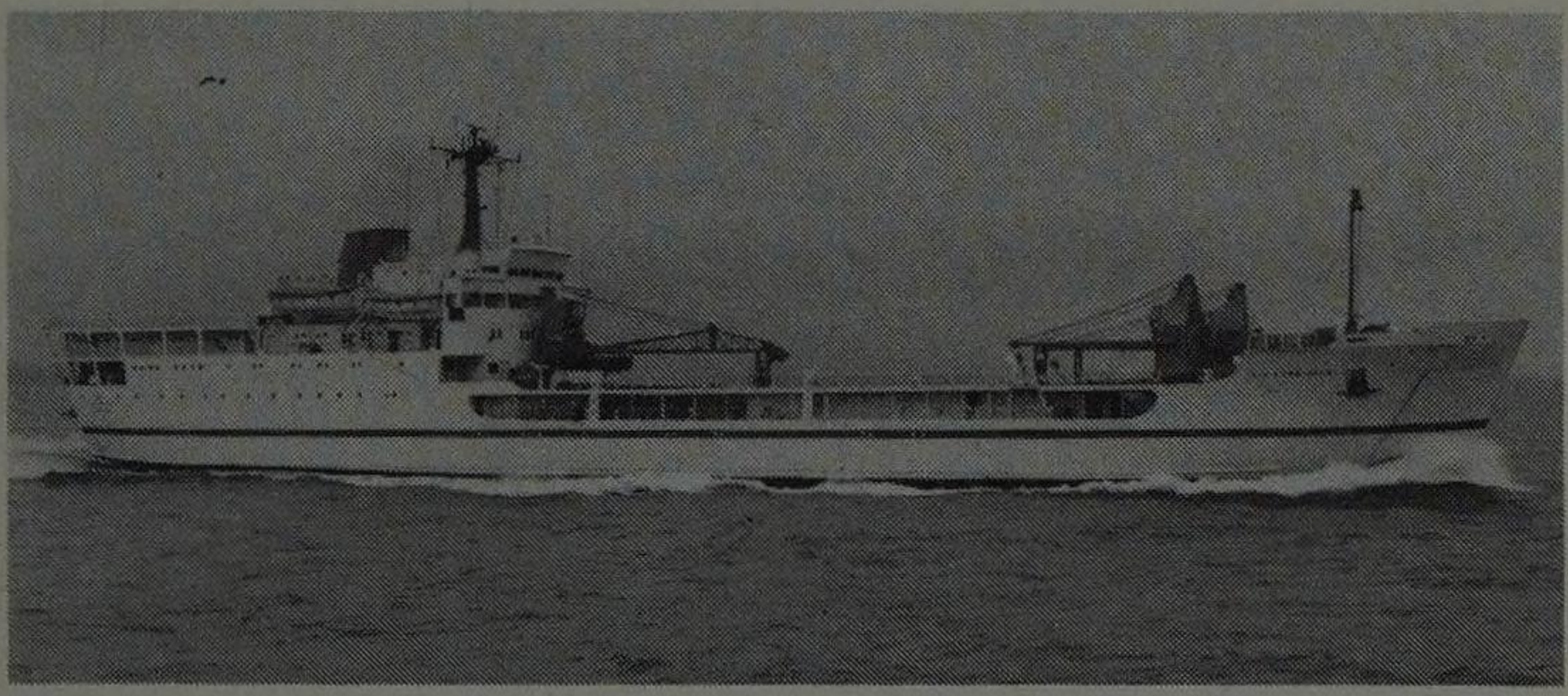
Top speed: 20 kt. **Range**: Over 6,000 nautical miles.

Programme: The 20 ship Newport class comprises: USS *Newport* (LST1179), USS *Manitowoc* (LST1180), USS *Sumter* (LST1181), USS *Fresno* (LST1182), USS *Peoria* (LST1183), USS *Frederick* (LST1184), USS *Schenectady* (LST1185), USS *Cayuga* (LST1186), USS *Tuscaloosa* (LST1187), USS *Saginaw* (LST1188), USS *San Bernadino* (LST1189), USS *Boulder* (LST1190), USS *Racine* (LST1191), USS *Spartanburg County* (LST1192), USS *Fairfax County* (LST1193), USS *La Moure County* (LST1194), USS *Barbour County* (LST1195), USS *Harlan County* (LST1196), USS *Barnstable County* (LST1197) and USS *Bristol County* (LST1198). All ships were commissioned between June 1969 and August 1972.

Notes: The Newport class stern-gated tank landing ships are the largest vessels capable of being beached. They can carry 300 Marines, plus 1,800 metric tons of supporting euipment.

Sir Bedivere class

Assault ships

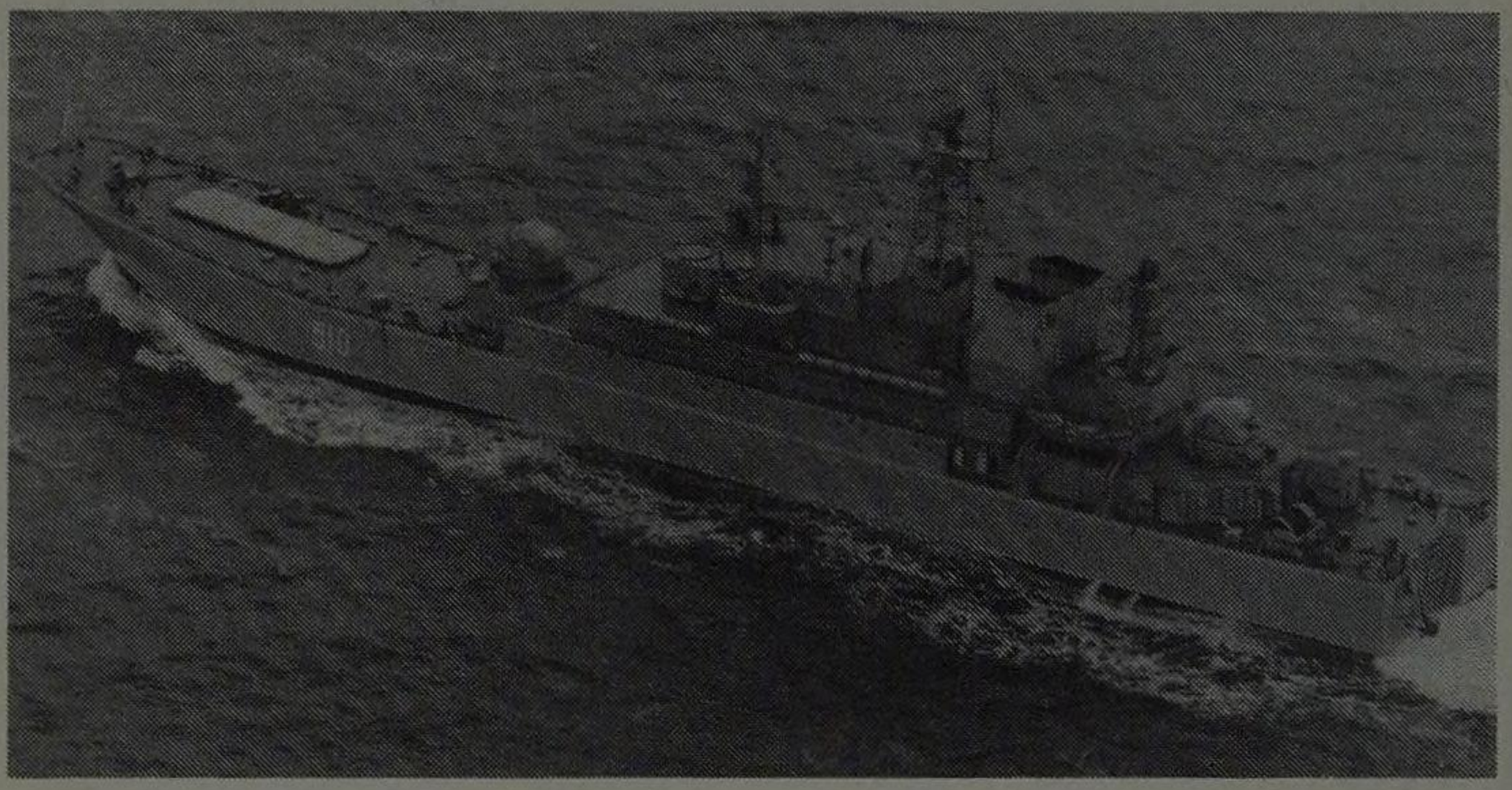


RFA *Sir Percivale* (L3036) at speed.

Role: Amphibious warfare. **Builder**: Swan Hunter, UK.
User: Royal Navy.
Basic data: 5,674 t full displacement; 413 ft (125.9 m) overall length; 58 ft (17.7 m) maximum beam. **Crew**: 69.
Propulsion: 2 Mirrlees diesels (total 9,400 bhp); 2 propellers.
Sensors: 1 Type 1006 nav radar.
Armament: Provision for 2 single 40 mm Bofors anti-aircraft guns.
Top speed: 17 kt. **Range**: 8,000 nautical miles at 15 kt.
Programme: The 6 ships in this class consisted of RFA *Sir Bedivere* (L3004), RFA *Sir Galahad* (L3005), RFA *Sir Geraint* (L3027), RFA *Sir Lancelot* (L3029), RFA *Sir Percivale* L3036) and RFA *Sir Tristram* (L3505). Laid down between March 1962 and April 1966 in 4 separate shipyards (subsequently merged into the Swan Hunter group), the ships were launched between June 1963 and October 1967 and all entered service between January 1964 and March 1968. Victims of an Argentinian air strike on 8 June 1982, *Sir Galahad* and *Sir Tristram* were both damaged, the former irreparably.
Notes: The Sir Bedivere class of multi-purpose logistic support and landing ship were designed as tank and other heavy vehicle carriers with aft section accommodation for around 340 military personnel. The ships have bow doors and ramp; a stern gate and light landing craft can replace the lifeboats abeam of the funnel, along with a large helicopter pad aft with support facilities. Military beaching lift capacity is quoted as being 340 tons.

Ropuchka class

Assault ships

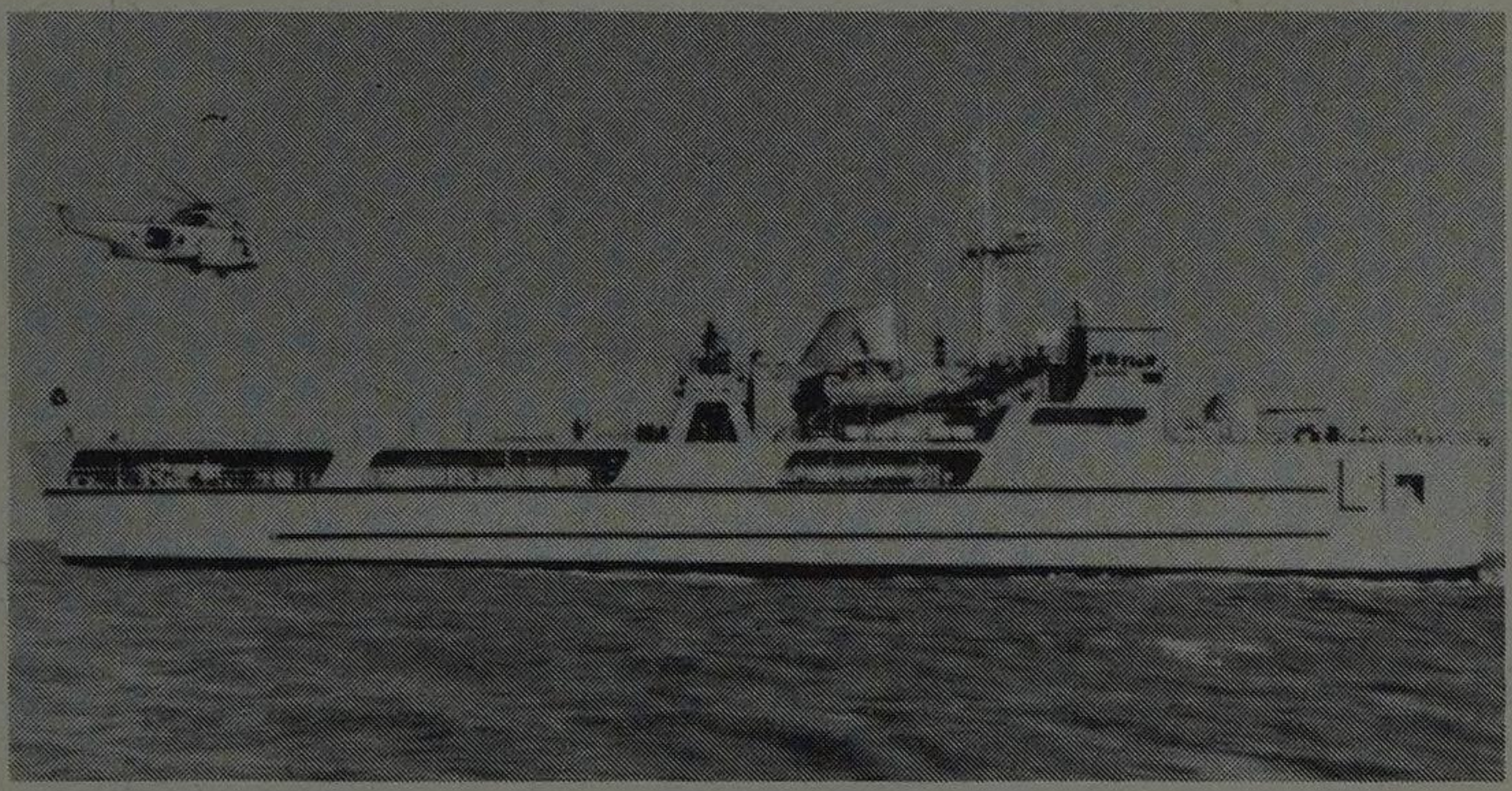


The Soviet Navy's Polish-built Ropuchka class LST, 1976.

Role: Amphibious warfare. **Builder**: Gdansk, Poland.
Users: Soviet Navy, South Yemen Navy.
Basic data: 3,600 t full displacement; 371 ft (113 m) overall length; 47.6 ft (14.5 m) maximum beam. **Crew**: 70.
Propulsion: 4 diesels (total 10,000 bhp); 2 propellers.
Sensors: 1 long-range air search radar; 1 IFF; 1 nav radar; 1 fire control radar.
Armament: 2 twin 57 mm anti-aircraft guns; some ships fitted with 1 quadruple SA-N-5 point air defence missile launcher.
Top speed: 17 kt. **Range**: Not known.
Programme: A reported 12 ship class built by the Polish yards at Gdansk between 1975 and 1978.
Notes: Designed to carry a balanced force of around 230 troops, amphibious vehicles and supporting equipment, the Ropuchka class have bow doors, stern gate and a covered vehicle deck forward. Ships of this class are often deployed with Soviet naval units operating in the Mediterranean, West African waters and the Indian Ocean region, where one was transferred to the South Yemen Navy during 1980. Although much smaller than the US Navy's Newport class tank landing ship, the Ropuchka class carry just over three quarters of the Newport class's troop complement and appear to be better able to defend themselves against air attack, at least until such times as the Newports receive their 2 Phalanx 20 mm close-in weapons systems.

Al Munassir type

Assault ships



SNV *Al Munassir* (L1) of the Omani Navy.

Role: Amphibious warfare. **Builder**: Brooke Marine, UK.
User: Omani Navy.
Basic data: 2,169 t full displacement; 275.6 ft (84 m) overall length; 49.2 ft (15 m) maximum beam. **Crew**: 47.
Propulsion: 2 Mirrlees Blackstone ES L8MGR diesels (total 2,440 bhp); 2 c–p propellers.
Sensors: 1 Decca TM 1229 nav radar; 1 Kelvin Hughes MS 45 echo sounder; 1 Redifon Omega navigator; 1 Ericsson laser range finder; 1 LSE optical fire director.
Armament: 1 OTO-Melara 76 mm dual-purpose gun; 2 single 20 mm guns; facilities including fuel, for helicopters.
Top speed: 12 kt. **Range**: 4,400 nautical miles at 12 kt.
Programme: Ordered in 1977, the sole *Al Munassir* (L1) was laid down in July of that year, launched in July 1978 and entered into service during April 1979.
Notes: Equipped with bow doors and ramp for inshore beaching, the *Al Munassir* is a compact ship, with a particularly blunt bow section. The ship can carry up to 550 tons of cargo, or up to 8 main battle tanks. There is accommodation for 188 embarked troops and the ship is equipped with an aft, elevated helicopter pad, capable of accepting a Westland Sea King/Commando-sized aircraft. In March 1982, the Sultanate of Oman placed an order with Brooke Marine for a somewhat larger 305 ft (93 m) landing support ship, of which 2 more are under construction for other overseas navies.

Alvsborg class

Minelayers

The Royal Swedish Navy's minelayer *Alvsborg* (M02).

Role: Minelaying. **Builder**: Karlskronavarvet, Sweden.
User: Royal Swedish Navy.
Basic data: 2,660 t full displacement; 303.15 ft (92.4 m) overall length; 48.2 ft (14.7 m) maximum beam. **Crew**: 97.
Propulsion: 2 Nohab-Polar 12-cylinder diesels (total 4,200 bhp); 1 c-p propeller.
Sensors: 1 surface search radar; 1 nav radar.
Armament: 3 single Bofors 40 mm anti-aircraft guns; 300 mines.
Top speed: 16 kt. **Range**: Not known.
Programme: This 2 ship class comprises *Alvsborg* (M02) and *Viborg* (M03). Laid down in November 1968 and October 1973, the ships entered service in April 1971 and February 1976, respectively.
Notes: These purpose-built minelayers (the Royal Swedish Navy also operates a converted merchantman as a minelayer) would, in times of crisis, be used to seed the waters of the Gulf of Bothnia and Western Baltic, thus denying access to enemy naval forces. In peacetime, the two Alvsborg class ships double as submarine tender (M02) and Flag Ship, Coastal Fleet (M03). A larger, more powerful vessel, the *Karlskrona* (M04), has recently joined the Swedish fleet, where it doubles as the service's training ship. Both Alvsborgs and the later *Karlskrona* have a helicopter landing deck immediately aft of the main superstructure.

Amvrakia (N05), formerly LSM 303.

Role: Minelaying. **Builder**: Charleston NSY, USA.
Users: Hellenic (Greek) Navy; South Korean Navy.
Basic data: 1,100 t full displacement; 203.5 ft (62.0 m) overall length; 34.5 ft (10.5) maximum beam. **Crew**: 65.
Propulsion: 2 General Motor 16–278A diesels (total 2,800 bhp); 2 propellers.
Sensors: Believed confined to communications equipment, although echo sounding equipment may be installed.
Armament: Up to 300 mines; 4 twin 40 mm anti-aircraft guns; 6 single 20 mm anti-aircraft guns.
Top speed: 12.5 kt. **Range**: 3,500 nautical miles at 12 kt.
Programme: Two of these former Landing Ships, Medium (LSM) are operated by the Hellenic Navy, *Aktion* (N04) and *Amvrakia* (N05). Constructed in 1943, the Greek vessels, along with others of the LSM 1 class, were converted to minelayers during 1952. South Korea operates 11, including 1 in the minelaying role.
Notes: These vessels are capable of carrying between 100 and 300 mines, depending upon type. The mines are winched aboard by the 4 derricks mounted in pairs fore and aft of the central wheelhouse. In operations, the mines are dispensed from the twin stern doors visible in the photograph. Interestingly, the current defensive armament fitted to these ships is greater than fitted to the original World War II LSMs.

Hunt class

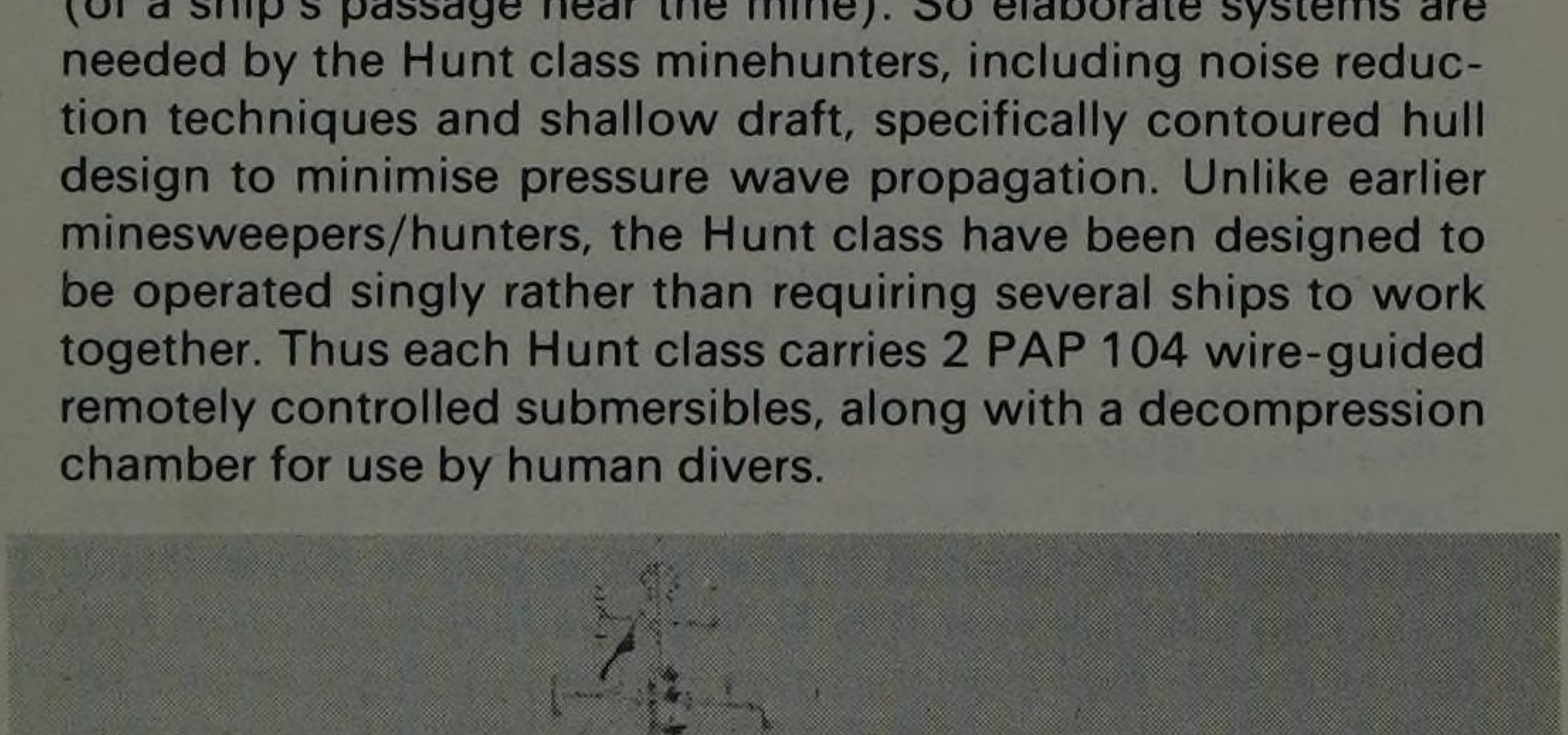
Minehunters

HMS *Ledbury* (M30), the 2nd of the Hunt class vessels.

Role: Mine disposal.
Builders: Vosper Thornycroft & Yarrow, UK.
User: Royal Navy.
Basic data: 675 t full displacement; 197 ft (60 m) overall length; 32.8 ft (10 m) maximum beam. **Crew**: 45.
Propulsion: 2 Paxman Deltic 59K diesels (total 3,540 bhp) used for main propulsion; 2 propellers, plus a 3rd Deltic diesel for low-speed operations and close manoeuvring.
Sensors: 1 Type 1006 nav radar; I Type 193M hull-mounted sonar.
Armament: 1 single 40 mm Mk 9 Bofors anti-aircraft gun.
Top speed: 15 kt. **Range**: Not known.
Programme: 11 Hunt class vessels had been ordered on an incremental basis by end-1982, comprising HMS *Brecon* (M29), HMS *Ledbury* (M30), HMS *Cattistock* (M31), HMS *Cottesmore* (M32), HMS *Brocklesby* (M33), HMS *Middleton* (M34), HMS *Dulverton* (M35), HMS *Chiddingfold* (M36) and HMS *Hurworth* (M37). Vosper Thornycroft, as lead yard, have or are building the 1st, 2nd, 3rd and 6th through 11th vessels, while Yarrow are responsible for the construction of the 4th and 5th ships. The lead ship, HMS *Brecon*, was ordered in May 1975, laid down in September 1975, launched in June 1978 and commissioned in December 1979. Two further vessels have been commissioned: HMS *Ledbury* in March 1981, HMS *Cattistock* in June 1982; and HMS *Brocklesby* was completed by November 1982. It should be noted that the time taken to build these ships has been progressively reduced; HMS

Brecon took 50 months, whilst HMS *Dulverton* should be completed in October 1983, or only 28 months from start.

Notes: While unquestionably expensive ships (a unit cost of £30 million being quoted for a fully equipped Hunt class vessel in the 1981 UK Defence Estimates), the complexity of these ships and their equipment reflect the ever more arduous requirements associated with detecting and neutralising the many variety of modern mines. As with all minesweepers/hunters built since the introduction of the magnetically triggered mine, the Hunt class vessels are designed to minimise magnetic influence. Unlike earlier generation wooden-hulled minesweepers/minehunters, the Hunt class employ a hull built from glass reinforced plastic, transverse frames being secured where necessary by titanium bolts to guarantee structural integrity. Many modern mines employ more than one method by which to trigger their detonation. They can be triggered by contact, magnetic influence, noise (of a ship's propellers) or pressure (of a ship's passage near the mine). So elaborate systems are needed by the Hunt class minehunters, including noise reduction techniques and shallow draft, specifically contoured hull design to minimise pressure wave propagation. Unlike earlier minesweepers/hunters, the Hunt class have been designed to be operated singly rather than requiring several ships to work together. Thus each Hunt class carries 2 PAP 104 wire-guided remotely controlled submersibles, along with a decompression chamber for use by human divers.



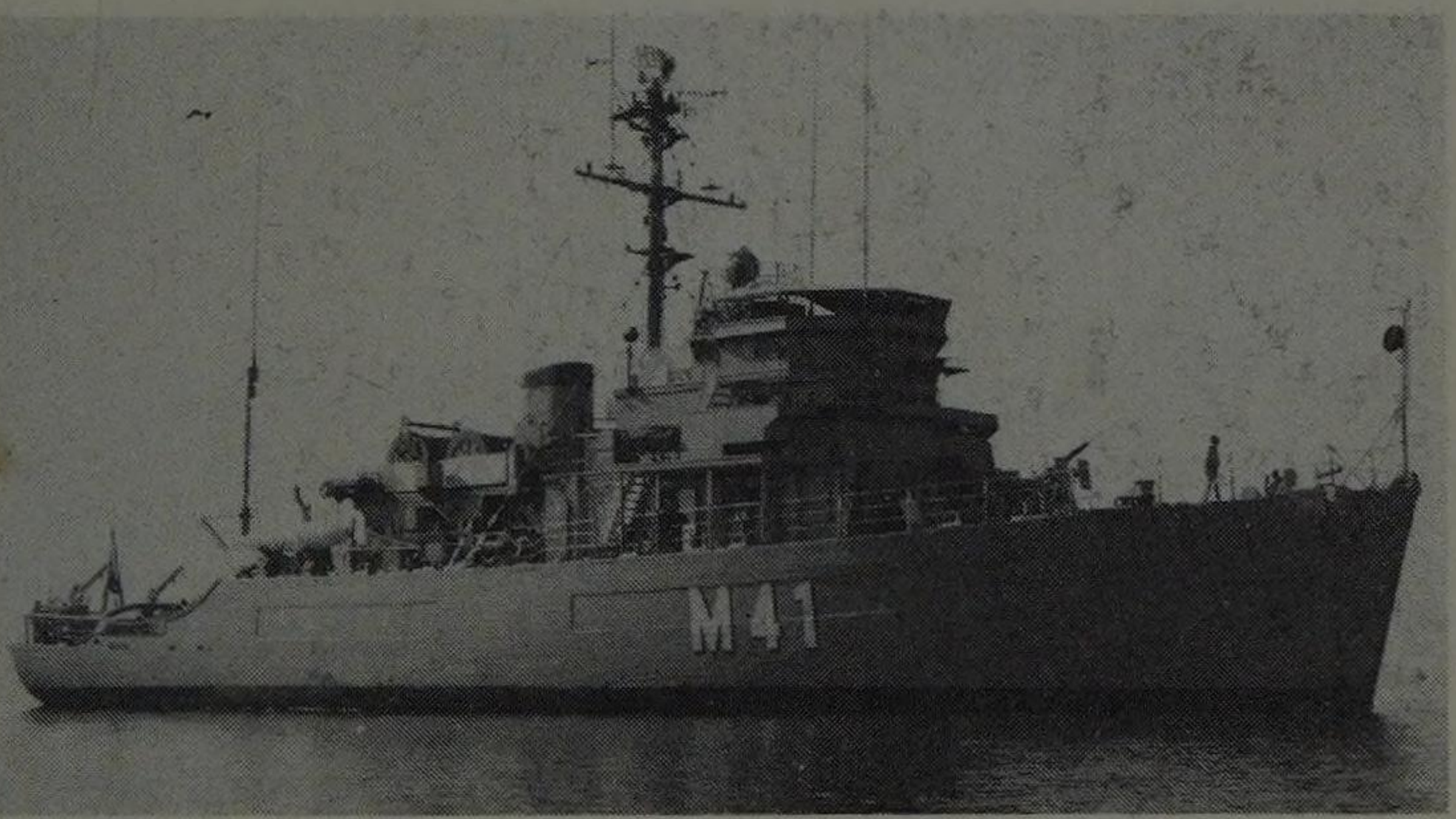
HMS *Cattistock* (M31) just prior to commissioning in June 1982.

Natya class

Minehunters

A Soviet Navy oceangoing Natya class minesweeper.

Role: Ocean minesweeping. **Builder**: Unkown, USSR.
Users: Soviet and Indian Navies.
Basic data: 750 t full displacement; 200.1 ft (61 m) overall length; 31.5 ft (9.6 m) maximum beam. **Crew**: 50.
Propulsion: 2 diesels (total 8,000 bhp); 2 propellers.
Sensors: 1 surface search and nav radar; 3 IFF; 1 fire control radar.
Armament: 2 twin 30 mm and 2 twin 25 mm anti-aircraft guns; 2 five-barrel 250 mm anti-submarine rocket launchers.
Top speed: 20 kt. **Range**: In excess of 4,000 nautical miles.
Programme: A reported 30 ship class for the Soviet Navy, built from 1970 through 1977, with an additional 6 ships built for the Indian Navy, delivered to that service at a rate of 2 per year between 1978 and 1980. These Indian Navy vessels carry the pennant numbers M61 through M66.
Notes: Designed to operate as oceangoing minesweepers, the Natya class can double as light anti-submarine escorts thanks to their exceptionally heavy armament for a minesweeper (raising questions over these ships' magnetic signature). Interestingly, even the quantatively larger, if physically smaller, classes of Soviet minesweepers carry a much heavier anti-air armament than their Western counterparts. Here it should also be noted that the Soviet Navy has by far the largest minesweeper fleet, numbering about 400.



Spain's oceangoing minesweeper *Guadelete* (M41).

Role: Ocean minesweeping. **Builders**: Various, USA.
Users: Navies of the USA and Spain.
Basic data: 750 t full displacement; 172 ft (52.4 m) overall length; 35 ft (10.7 m) maximum beam. **Crew**: 72.
Propulsion: 4 Packard or Waukesha diesels (total 2,280 bhp); 2 c-p propellers (4 US vessels, MSO 428 to 431, have 4 General Motors diesels giving a total of 1,520 bhp).
Sensors: 1 SPS-5C or SPS-53E/L surface search radar; 1 UQS-1 or SQQ-14 sonar. (Spanish ships have Decca TM625 nav radar.)
Armament: 1 single 20 mm Mk 68 and 2 single 12.7 mm anti-aircraft guns (some US Naval Reserve ships have 1 single 40 mm Mk gun).
Top speed: 15.5 kt. **Range**: 3,300 nautical miles at 10 kt.
Programme: Of an original 58 ship class built for the US Navy between 1951 and 1956, only 23 remained on US Navy inventory at the end of 1980. Of these US vessels, only 3 are in active service (all with the Atlantic Fleet), the rest being employed by the US Naval Reserve. Spain operates a further 4 ships of this class. The 7 ships in active operations comprise USS *Fidelity* (MSO443), USS *Illusive* (MSO448), USS *Leader* (MSO490), along with Spain's *Guadelete* (M41), *Guadalmedina* (M42), *Guadalquivir* (M43) and *Guardiana* (M44).
Notes: Of conventional wooden-hulled construction.

Coniston class Minehunters

Grainne (CM10), an Irish Navy Coniston class minesweeper.

Role: Mine disposal. **Builders**: Various, UK.
Users: Navies of Argentina, Australia, Ghana, India, Ireland, Malaysia, South Africa and UK.
Basic data: 427 t full displacement; 153 ft (46.6 m) overall length; 28.6 ft (8.7 m) maximum beam. **Crew**: 29 to 38.
Propulsion: 2 Napier Deltic diesels (total 3,000 bhp) or 2 Mirrlees JVSS 12 diesels (total 2,500 bhp); 2 propellers.
Sensors: 1 Type 978 nav radar; 1 Type 193 hull-mounted sonar.
Armament: 1 single 40 mm Bofors anti-aircraft gun.
Top speed: 16 kt. **Range**: 3,000 nautical miles at 8 kt.
Programme: Originally a 90 ship Royal Navy class built between 1953 and 1960, the Coniston, or 'Ton' class vessels now serve with a number of navies, a mid-1982 census indicating the following distribution: Argentina 6, Australia 3, Ghana 1, India 4, Ireland 3, Malaysia 5, South Africa 6 and UK 33.
Notes: Korean War experience with magnet and acoustic influence mines pointed up the shortcomings of existing minesweepers and led directly to the procurement of the Coniston class, built in two versions, one suited to minesweeping, the other to minehunting. The minesweepers operate as a team, essentially trawling various cable-cutting, noisemaking or magnetic field generators through a sea area of conventional mines. The introduction of more complex mines led to the need for minehunters, which carry active sonar for detection, along with divers and other equipment to complete the task.

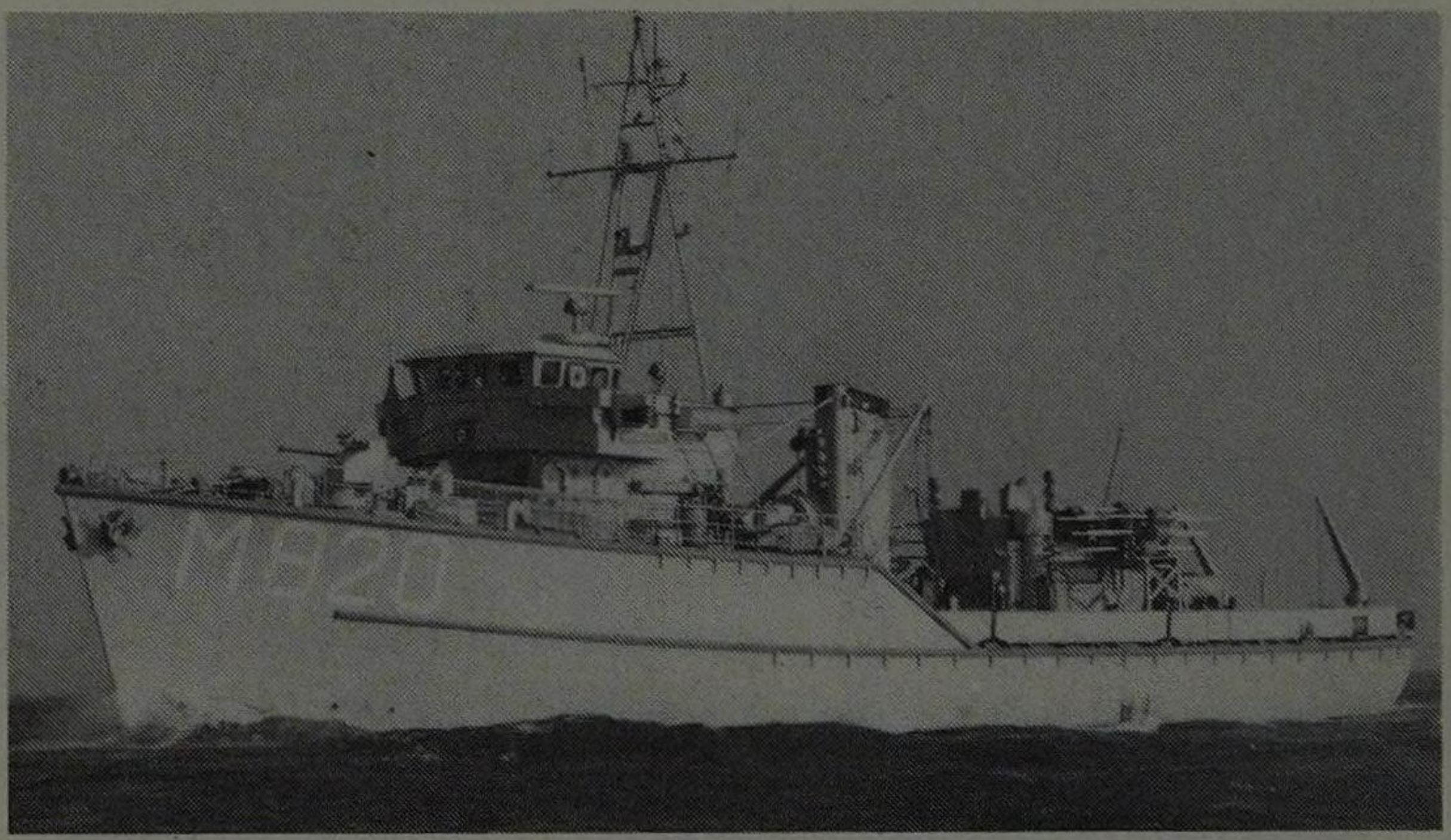
Type 331 class Minehunters

Tubingen (M1074), a Type 331A minehunter, 1978.

Role: Mine disposal. **Builder**: Burmester, Federal Germany.
User: Federal German Navy.
Basic data: 420 t full displacement; 155.7 ft (47.45 m) overall length; 22.6 ft (8.3 m) maximum beam. **Crew**: 46.
Propulsion: 2 Maybach diesels (total 4,000 bhp); 2 c-p propellers.
Sensors: 1 TRS-N surface search and nav radar; 1 DSQS-11 towed variable depth sonar (fitted to all Type 331As), or 1 Plessey Type 193M hull-mounted sonar (fitted to Type 331Bs).
Armament: 1 single 40 mm anti-aircraft gun.
Top speed: 17 kt. **Range**: 3,450 nautical miles at 9 kt.
Programme: Originally built as Type 320 Lindau class mine-sweepers and completed between 1957 and 1959, 12 of these vessels have been modified into Type 331 minehunters, commencing with the conversion of 2 craft into Type 331Bs, *Flensburg* (M1084) and *Fulda* (M1086), between 1968 and 1971. This was followed by the conversion to Type 331A, between 1975 and 1980, of the following: *Gottingen* (M1070), *Koblenz* (M1071), *Lindau* (M1072), *Tubingen* (M1074), *Wetzlar* (M1075), *Weilheim* (M1077), *Cuxhaven* (M1078), *Marburg* (M1080), *Minden* (M1085) and *Volklingen* (M1087).
Notes: Starting life as wooden-hulled minesweepers, the Type 331s form the central, manned element of the West German-devised Troika minehunting system. The Troika system employs drone, or operationally unmanned boats, along with the French-developed PAP-104 remote-controlled submersible to do the actual hunting; all of which is controlled from the Type 331s with 3 drones each.

Dokkum class

Minehunters

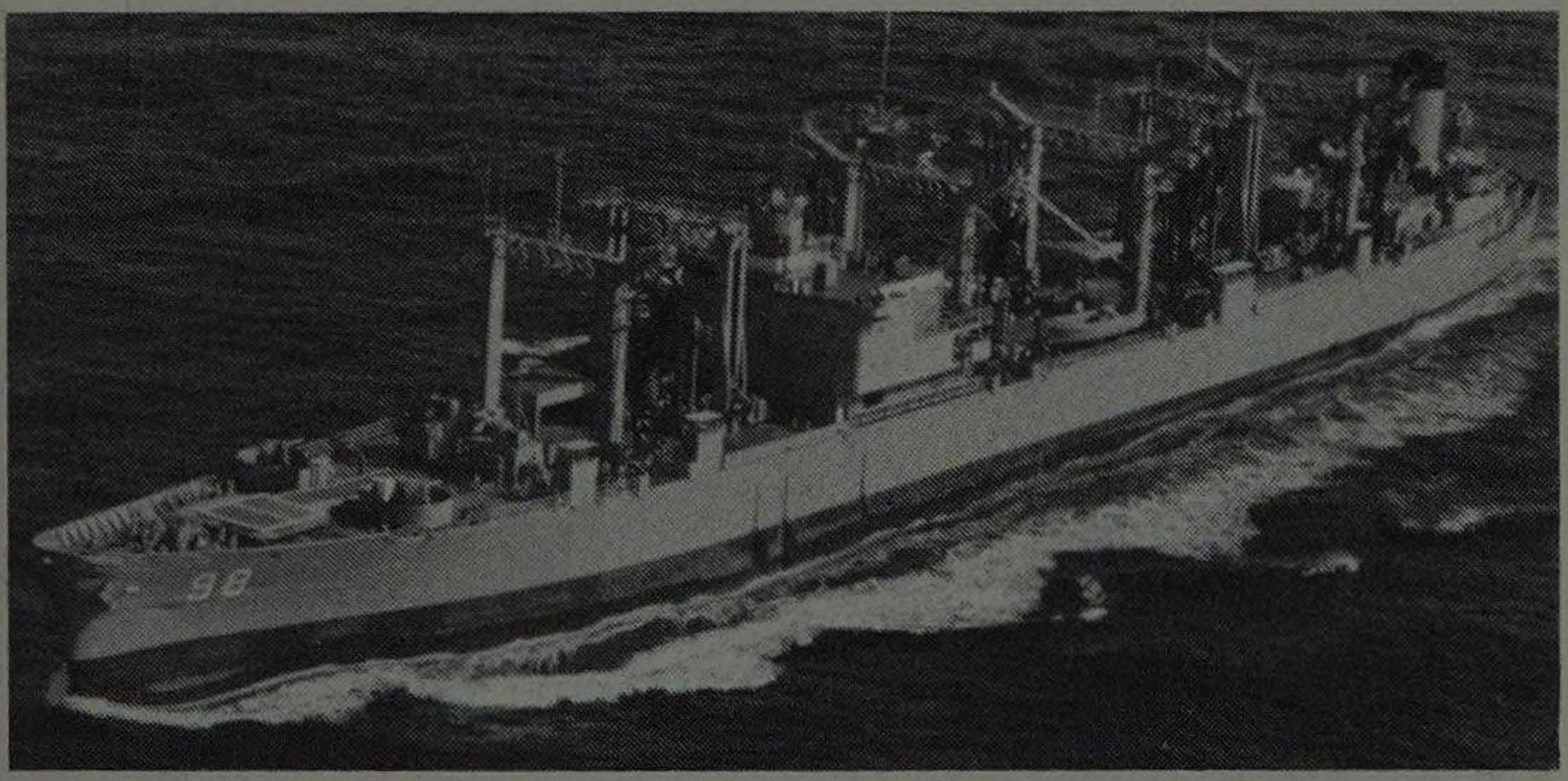


The diver-carrying HNLMS *Woeren* (M820).

Role: Mine disposal. **Builders**: Various, Netherlands.
User: Royal Netherlands Navy.
Basic data: 417 t full displacement; 152.95 ft (46.6 m) overall length; 28.7 ft (8.75 m) maximum beam. **Crew**: 31.
Propulsion: 2 Fijenoord-M.A.N. diesels (total 2,500 bhp); 2 propellers.
Sensors: 1 Decca 1229 nav radar; 1 Type 193M hull-mounted sonar (fitted to M801, M818, M828 and M842 only).
Armament: 1 twin Bofors 40 mm anti-aircraft gun.
Top speed: 14 kt. **Range**: 2,500 nautical miles at 10 kt.
Programme: An 18 vessel class built between June 1953 and December 1958, the class comprises HNLMS *Dokkum* (M801), HNLMS *Drunen* (M818), HNLMS *Veere* (M842) and HNLMS *Staphorst* (M828) operated as minehunters; HNLMS *Roermond* (M806), HNLMS *Woeren* (M820) and HNLMS *Rhenen* (M844) operated as diver-carrying mine disposal vessels; HNLMS *Hoogezand* (M802), HNLMS *Naaldwijk* (M809), HNLMS *Abcoude* (M810), HNLMS *Drachten* (M812), HNLMS *Ommen* (M813), HNLMS *Giethoorn* (M815), HNLMS *Venlo* (M817), HNLMS *Naarden* (M823), HNLMS *Hoogeveen* (M827), HNLMS *Sittard* (M830) and HNLMS *Gemert* (M841) operated as minesweepers.
Notes: Comparable to the Royal Navy's Coniston ('Ton) class.

Ashtabula class

Support ships



USS *Caloosahatchee* (A098) with the US Atlantic Fleet, 1976.

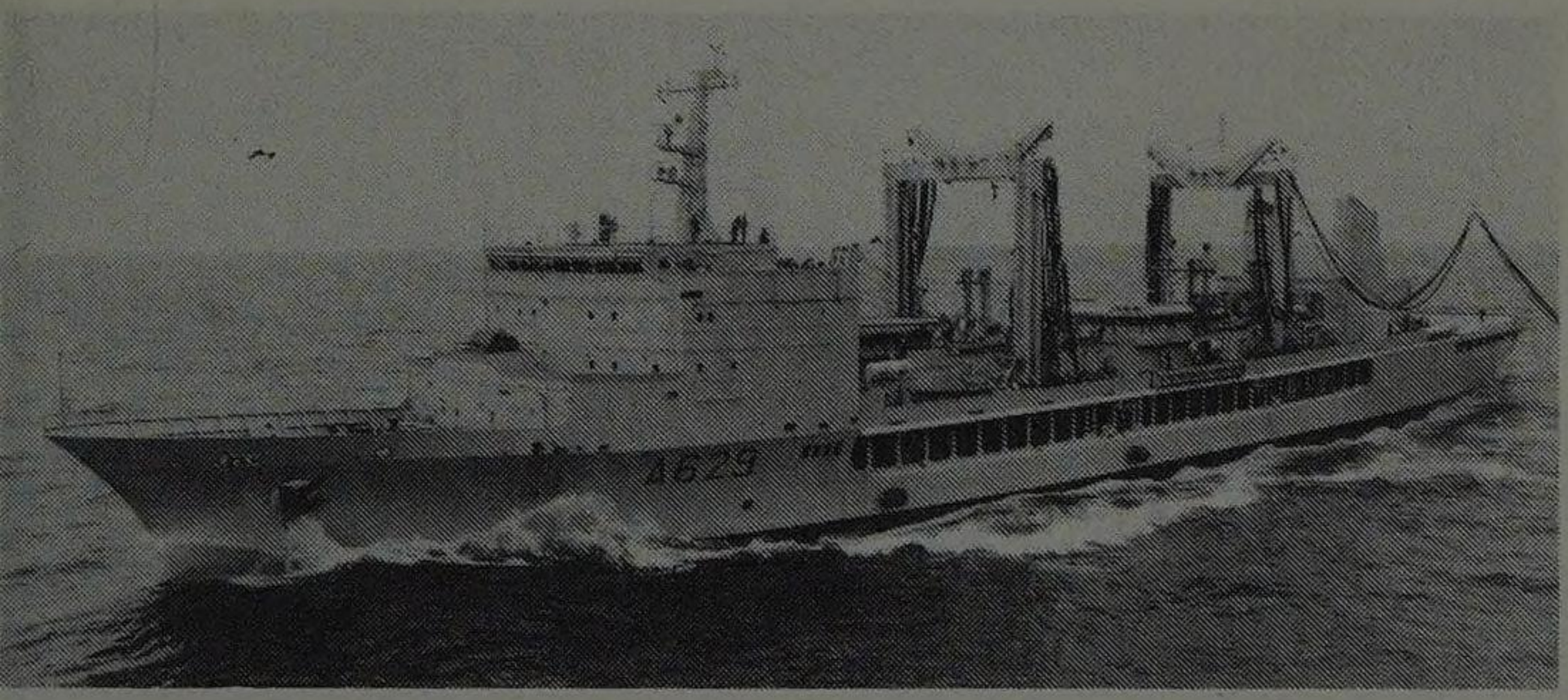
Role: Underway replenishment.
Builder: Bethlehem Steel, USA.
User: US Navy.
Basic data: 34,750 t full displacement; 644 ft (196.3 m) overall length; 75 ft (22.9 m) maximum beam. **Crew**: 345.
Propulsion: 2 geared steam turbines (total 13,500 shp); 2 propellers.
Sensors: 1 SPS-10 surface search and nav radar.
Armament: 2 single 3 inch Mk 26 anti-aircraft guns.
Top speed: 18kt. **Range**: In excess of 8,000 nautical miles.
Programme: This 3 ship class, comprising USS *Ashtabula* (A051), USS *Caloosahatchee* (A098) and USS *Canisteo* (A099), are all that are left of an original 35 ships class delivered to the US Navy and Esso Oil Company between January 1939 and March 1946. In the mid-1960s, these Ashtabula class ships underwent a major reconstruction, referred to as 'Jumboisation', during which an additional 91 feet (27.7 m) section was inserted amidships to increase both space for tankage and other stores.
Notes: These large US Navy oilers can carry 143,000 barrels of fuel oil, plus 175 tons of ammunition and 100 tons of general provisions. While the gun armament, along with its fire director systems, were removed in the late 1970s, the gun mounts have been retained. These ships carry no helicopter operating facilities, but have a small platform on the bow section on to which stores can be transferred to or from other ships by helicopter.

HMAS *Supply* (A0195) showing her 4 forward-firing Bofors.

Role: Underway replenishment.
Builder: Harland & Wolff, UK.
User: Royal Australian Navy.
Basic data: 26,500 t full displacement; 583 ft (177.7 m) overall length; 70.85 ft (21.6 m) maximum beam. **Crew**: 205.
Propulsion: 2 double reduction steam turbines (total 15,000 bhp); 2 propellers.
Sensors: 1 Decca nav radar.
Armament: 2 twin and 2 single Bofors 40 mm anti-aircraft guns.
Top speed: 17 kt. **Range**: 8,500 nautical miles at 13 kt.
Programme: HMAS *Supply* (A0195) was laid down as HMS *Tide Austral* in August 1952 and joined the Royal Navy in 1955, where it served until 1962, when it was transferred to the Royal Australian Navy in August of that year.
Notes: Although somewhat shorter than the aircraft carrier HMAS *Melbourne*, HMAS *Supply* (A0195) has been the heaviest ship to be operated by the Royal Australian Navy since being bought by that service in 1962. Capable of refuelling a destroyer in less than 30 minutes, the *Supply* will remain as the service's sole fleet oiler until the mid-1980s, when it will be replaced by the Durance type oiler, HMAS *Success*. A big ship by any yardstick, *Supply* is quoted as being able to carry up to 17,600 metric tons of useful load.

Durance class

Support ships

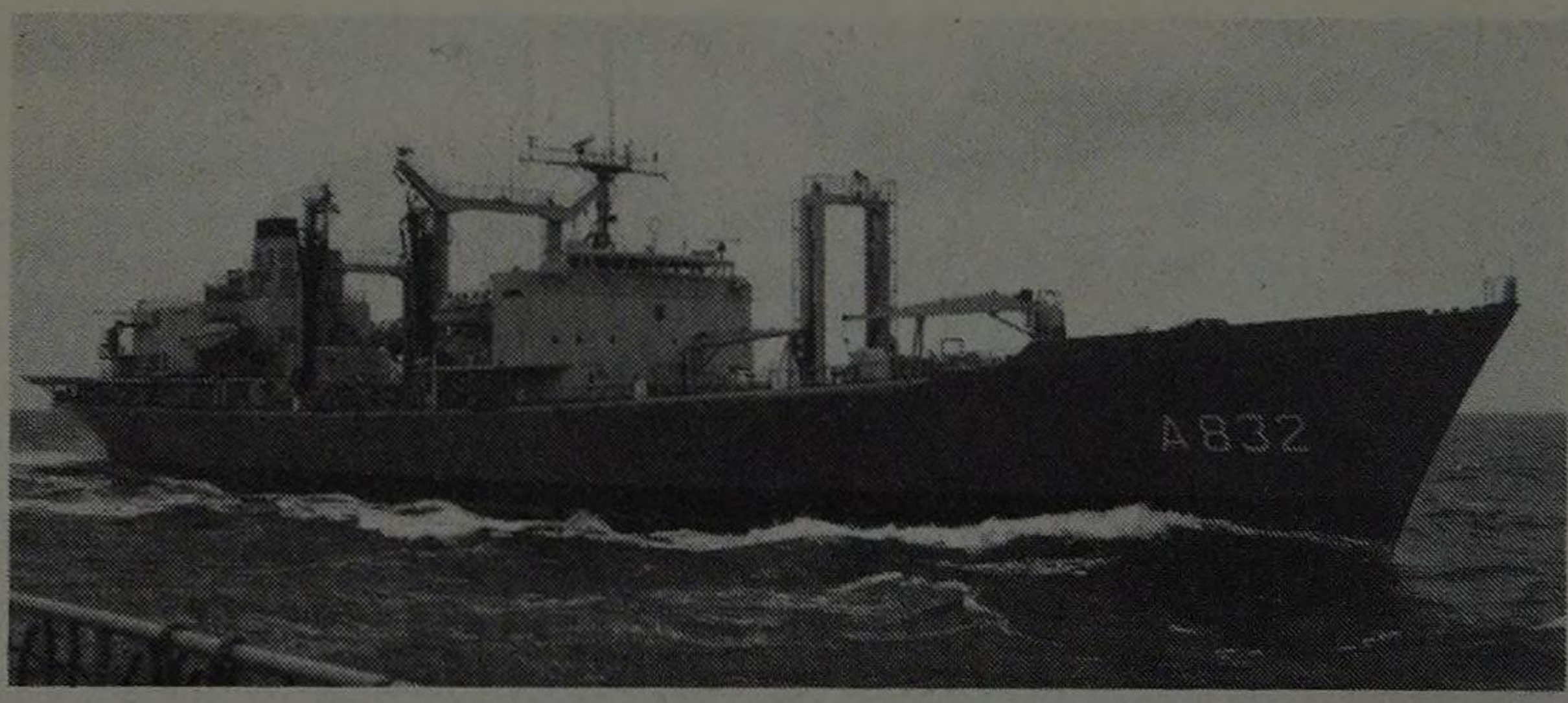


French Navy's *Durance* (A629), 1976.

Role: Underway replenishment.
Builder: DCAN Brest, France. **User**: French Navy.
Basic Data: 17,800 t full displacement; 515.1 ft (157 m) overall length; 68.9 ft (21 m) maximum beam. **Crew**: 159.
Propulsion: 2 SEMT-Pielstick 16 PC 2.5V diesels (total 20,000 bhp); 2 c-p propellers.
Sensors: 1 navigational radar.
Armament: 1 Westland Lynx (lightweight anti-submarine torpedoes are stored aboard ship); 2 single Bofors 40 mm anti-aircraft guns.
Top speed: 19 kt. **Range**: 9,000 nautical miles at 15 kt.
Programme: Ordered on an incremental basis, 4 Durance class ships had been contracted for the French Navy by the end of 1981. The first of class, *Durance* (A629), was laid down in December 1973, launched in September 1975 and entered service in December 1976. The second ship, *Meuse* (A607), was laid down in June 1977 and came into service in October 1980. *Var* (A ...) was ordered in October 1977 and is planned to enter service in 1983, while the so far unnamed fourth vessel was ordered in 1981 for 1986 delivery.
Notes: Capable of remaining at sea for up to 30 days, the Durance class ships can store up to 10,000 tons of cargo, around 95 per cent of which is fuel. Of this fuel load, 7,500 tons is fuel oil, 1,500 tons is diesel and 500 tons is aviation turbine fuel. This class can replenish up to 3 ships simultaneously. Up to 45 personnel can be accommodated besides the normal crew.

Improved Poolster type

Support ships



HNLMS *Zuiderkruis* (A832), 1981.

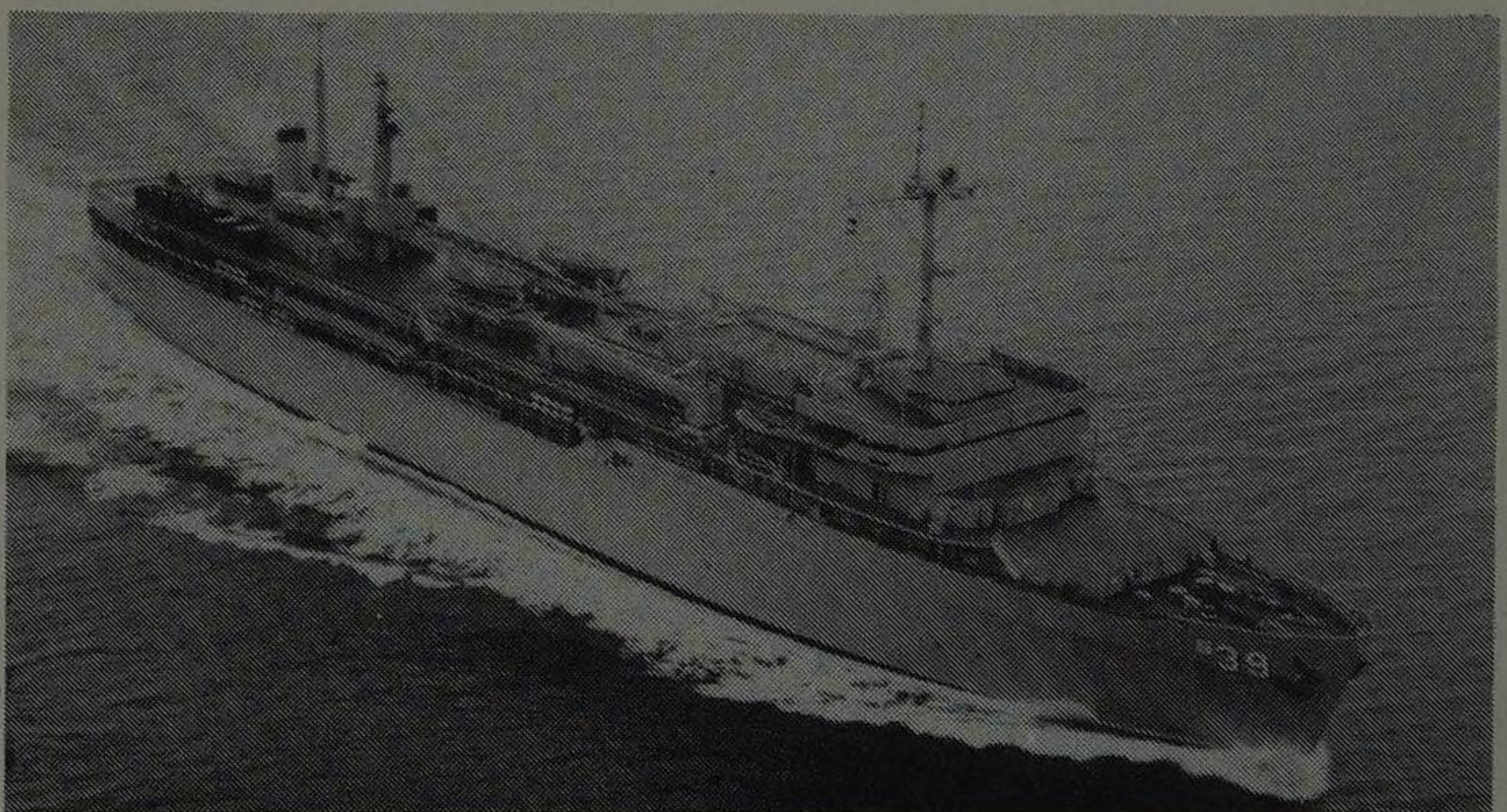
Role: Underway replenishment.
Builder: Verolme, Netherlands.
User: Royal Netherlands Navy.
Basic data: 17,357 t full displacement; 556.4 ft (169.59 m) overall length; 66.6 ft (20.3 m) maximum beam. **Crew**: c. 200.
Propulsion: 2 Werkspoor TM410 diesels (total 22,500 bhp); 2 propellers.
Sensors: 1 Decca 1226 navigational radar.
Armament: 2 Westland Lynx helicopters; 1 twin 20 mm anti-aircraft gun. (Note: the ship carries a store of lightweight anti-submarine torpedoes, with which to arm the Lynx helicopters.)
Top speed: 21 kt. **Range**: In excess of 6,000 nautical miles.
Programme: HNLMS *Zuiderkruis* (A832) was laid down in July 1973, launched in October 1974 and entered service in June 1975.
Notes: Employing the same hull design and basic layout of its earlier sister ship HNLMS *Poolster* (A835), the *Zuiderkruis* differs principally in employing diesel rather than the geared steam turbines of its predecessor. Other differences include a lighter calibre gun armament (20 mm rather than 40 mm) and the deletion of the *Poolster*'s hull-mounted sonar equipment. Although marginally longer than its sister ship, *Zuiderkruis* carries a maximum of 9,600 tons cargo, compared with the *Poolster*'s 10,300 tons. Of the latter's 9,600 tons cargo capacity, 9,000 tons is typically devoted to the carriage of fuel, used to refuel the other anti-submarine task group ships that the replenisher normally accompanies.

The small fast fleet tanker, RFA *Grey Rover* (A269).

Role: Underway replenishment. **Builder**: Swan Hunter, UK.
User: Royal Navy.
Basic data: 11,522 t full displacement; 461 ft (140.5 m) overall length; 63 ft (19.2 m) maximum beam. **Crew**: 47.
Propulsion: 2 SEMT-Pielstick 16PA4 diesels (total 16,000 bhp); 1 c-p propeller.
Sensors: 1 surface search radar; 1 Type 1006 nav radar.
Armament: Operating pad for up to Sea King-sized helicopter.
Top speed: 19 kt. **Range**: 15,000 nautical miles at 15 kt.
Programme: The 5 ships of this class comprise RFA *Green Rover* (A268), RFA *Grey Rover* (A269), RFA *Blue Rover* (A270), RFA *Gold Rover* (A271) and RFA *Black Rover* (A273). Launched between mid-December 1968 and October 1973, the 5 ships entered service with the Royal Fleet Auxiliary (hence their RFA prefix) between August 1969 and August 1974.
Notes: These fast small fleet tankers are physically characterised by their relatively short main superstructure dominated by the single, very tall funnel. In operation, the Rover class carry up to 6,600 tons of fuel oil, fresh water, dry and refrigerated stores which can be transferred via the main pair of transfer stations at each side of the main gantry structure ahead of the bridge, plus another pair immediately aft of the funnel. While the ships incorporate a large elevated helicopter operating pad at their stern, no hangar or other facilities are carried.

Emory S. Land class

Support ships

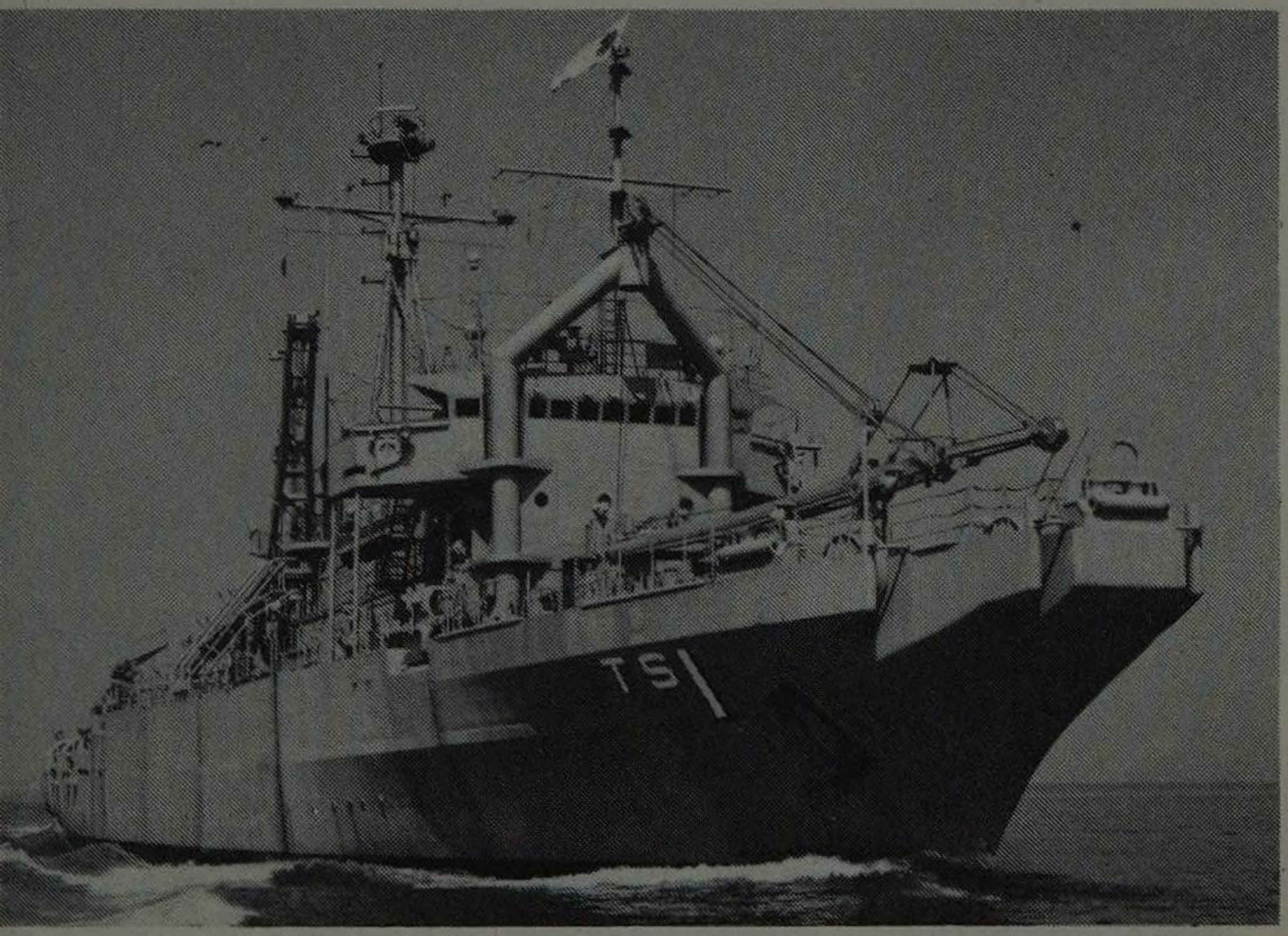


USS *Emory S. Land* (AS39) on sea trials, 1979.

Role: Submarine support.
Builder: Lockheed Shipbuilding, USA.
User: US Navy.
Basic data: 23,000 t full displacement; 645.6 ft (196.8 m) overall length; 85 ft (25.9 m) maximum beam. **Crew**: 1,351.
Propulsion: 1 De Laval geared steam turbine (20,000 shp); 1 propeller.
Sensors: 1 SPS-10 surface search and nav radar.
Armament: 2 single 40 mm Mk 19 and 4 single 20 mm Mk 67 anti-aircraft guns.
Top speed: 18 kt. **Range**: In excess of 6,000 nautical miles.
Programme: A 3 ship class, all were built by Lockheed Shipbuilding and comprise USS *Emory S. Land* (AS39), USS *Frank Cable* (AS40) and USS *McKee* (AS41). These vessels were commissioned in 1979, 1980 and 1981, respectively.
Notes: A development of the preceding L.Y. Spear class of submarine tenders, the Land class have been specifically designed to meet the needs of servicing Los Angeles class submarines on extended operations away from their home port. Essentially floating maintenance bases, these large ships have more than 900 compartments on 13 different deck levels. Each ship can support 12 submarines, of which up to 4 can be handled simultaneously. The ships have a helicopter pad, but no hangar or aircraft of their own.

Edenton class

Support ships



The British-built USS *Edenton* (ATS1) oceangoing tug.

Role: Salvage and rescue.
Builder: Brooke Marine, UK.
User: US Navy.
Basic data: 3,117 t full displacement; 282.8 ft (86.2 m) overall length; 50 ft (15.2 m) maximum beam. **Crew**: 93.
Propulsion: 4 Paxman 12 YLCM diesels (total 6,000 bhp); 2 propellers, plus bow thruster.
Sensors: 1 SPS-53 navigational radar.
Armament: 2 single 20 mm anti-aircraft guns.
Top speed: 16 kt. **Range**: 12,000 nautical miles at 12 kt.
Programme: The first of this 3 ship class was ordered in 1966, to be followed by contracts for the second and third vessels in 1967. The 3 ships, USS *Edenton* (ATS1), USS *Beaufort* (ATS2) and USS *Brunswick* (ATS3) entered service with the US Navy in January 1971, January 1972 and December 1972.
Notes: These powerful British-built oceangoing tugs can tow ships of over 50,000 tons displacement. The Edenton class also carry the specialised equipment required for rescue and salvage diving operations associated with submarine recovery.

Arromanches class

Landing craft

The British Army's *Arromanches* (L105), 1981.

Role: Amphibious warfare. **Builder**: Brooke Marine, UK.
User: British Army.
Basic data: 282 t full displacement; 109.1 ft (33.26 m) overall length; 27.2 ft (8.3 m) maximum beam. **Crew**: 6.
Propulsion: 2 Dorman 8JTCWM diesels (total 660 bhp); 2 propellers.
Sensors: 1 Seaveyor nav radar; 1 Kelvin Hughes MS 45 echo sounder.
Armament: Nil.
Top speed: 9.5 kt loaded; 10 kt unloaded. **Range**: Limited.
Programme: Ordered for use with the British Army in March 1980, this currently 2 boat class comprises *Arromanches* (L105) and *Antwerp* (L106), both of which were delivered during August 1981.
Notes: Unglamorous as these vessels may appear, their contribution in support of amphibious landings, such as that carried out by British forces to repossess the Falkland Islands, is vital. Carried as deck cargo to the theatre of action, these ramped landing craft (their official designation is Ramped Craft, Landing, or RCL), are used to shuttle up to 96 tons of heavy vehicles or other necessary supplies ashore. Equipped with one heavy-duty kedge winch and two ramp winches, these vessels are manned by 2 NCOs and 4 soldiers.

Aist class

Landing craft

An Aist class high-speed landing craft.

Role: Amphibious warfare. **Builder**: Unknown, USSR.
User: Soviet Navy.
Basic data: c.220 t full displacement; 156.8 ft (47.8 m) overall length; 57.4 ft (17.5 m) maximum beam. **Crew**: c.8-10.
Propulsion: 4 gas turbine/turboprops (total c.16,000 shp); 2 lift fans (driven from the gas turbines).
Sensors: 1 surface search and nav radar; 1 fire control radar for 30 mm guns; 3 IFF.
Armament: 2 twin 30 mm anti-aircraft guns mounted side-by-side atop the bow section.
Top speed: 65 kt. **Range**: Not known.
Programme: The Aist class air cushion landing craft entered service with the Soviet Navy around the middle of the 1970s since when the type is reported to have remained in production at an increasing rate.
Notes: The Aist class is the largest of 3 known Soviet classes of air cushion landing craft (the other types being the Lebed class and the even smaller Gus class of 27 tons full displacement. The Soviet Navy is currently by far the world's largest single user of military air cushion vehicles, with the US Navy having relatively recently also opted to procure this type of vehicle, first developed in Britain during the late 1950s. Besides its obvious speed advantage, the air cushion craft has the equally important advantage of being truly amphibious in itself. The Aist class can carry up to 4 light tanks and 150 troops.

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